Draft

Phase I RFI/RI
Technical Memorandum Number 1

Rocky Flats Plant
Inside Building Closures
(Operable Unit 15)

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

Environmental Restoration Program

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LIST OF ACRONYMS

BRA	Baseline Risk Assessment
CDH	Colorado Department of Health
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	constituent of concern
DEHP	bis(2-ethylhexyl)phthalate
DOE	United States Department of Energy
EB	Electron Beam
EG&G	EG&G Rocky Flats, Inc.
EMRG	Environmental Management Radiological Guidelines
EPA	United States Environmental Protection Agency
FSP	Field Sampling Plan
GENII	Hanford Environmental Dosimetry System (Generation II)
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
HEPA	High Efficiency Particulate Air (filter)
IAG	Interagency Agreement
IHSS	Individual Hazardous Substance Site
NFA	No Further Action
NRC	Nuclear Regulatory Commission
OSHA	Occupational Safety and Health Act
OU	operable unit
QA/QC	quality assurance/quality control
RCA	Radiologically Controlled Area
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Database System

RFI	RCRA Facility Investigation
RFP	Rocky Flats Plant
RI	remedial investigation
RPT	Radiation Protection Technologist
SOP	Standard Operating Procedure
TAL	Target Analyte List
TCL	Target Compound List
TM#1	Technical Memorandum Number 1
TM#2	Technical Memorandum Number 2
VOC	volatile organic compound

LIST OF REFERENCES

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Section 1.0

1.0 INTRODUCTION

Per the Rocky Flats Plant (RFP) Interagency Agreement (IAG) dated January 22, 1991, between the United States Department of Energy (DOE), the United States Environmental Protection Agency (EPA), and the State of Colorado Department of Health (CDH), and as specified in the Final Phase I Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)/Remedial Investigation (RI) Work Plan for RFP Operable Unit 15 (OU 15) - Inside Building Closures (dated March 23, 1993), technical memoranda shall be prepared describing the field sampling activities and the Baseline Risk Assessment (BRA). This document is Technical Memorandum Number 1 (TM#1) for the OU 15 Phase I RFI/RI. TM#1 describes the implementation of the Field Sampling Plan (FSP), outlined in the Final Phase I RFI/RI Work Plan for OU 15 (the Work Plan) and provides the results of the sampling activities which have been completed. In addition, it addresses portions of the BRA necessary to complete the objectives set out below for TM#1. The remainder of the BRA will be described in Technical Memorandum Number 2 (TM#2), to be submitted at a later date. The contents of TM#1 and TM#2 form the basis for the Phase I RFI/RI for OU 15.

1.1 Objectives

The overall objectives of the OU 15 Phase I RFI/RI are stated in Section 4.0 of the Work Plan. The Work Plan was developed to provide a technically adequate basis for characterization of indoor contamination at the Individual Hazardous Substance Sites (IHSSs) which comprise OU 15. Its general purpose is to:

1. Characterize the nature and extent of contamination associated with the OU 15 IHSSs.

2. Determine whether releases have occurred from any of the OU 15 IHSSs.

3. Support the BRA and closure activities.

4. Determine the need for additional investigation (Stage III - outdoor).

This document presents the methods and results associated with the OU 15 Stage I and II field investigations. It provides the decision basis for recommending whether additional outdoor investigation should be performed and for determining whether the IHSSs meet the clean closure performance standards defined in the Work Plan. For each IHSS, the decision regarding the need for Stage III investigation is based on an evaluation of release potential and mechanisms, and on the comparison of contaminant concentration gradients to screening levels. The determination of clean closure status for each IHSS is based on the comparison of contaminant concentrations to screening levels. For both decision processes, the screening levels have been established for radiological constituents based on the standards specified in the Work Plan, and for chemical constituents using risk-based methods.

TM#1 is being prepared and submitted to EG&G Rocky Flats, Inc. (EG&G), DOE, EPA, and CDH prior to the submission of the Draft Phase I RFI/RI Report for OU 15. One of the purposes of this document is to maintain contact with the various parties involved in the OU 15 closures and to ensure concurrence on technical issues as the project proceeds. Following approval by EPA and CDH, TM#1 will form the basis for the preparation of the Draft Phase I RFI/RI Report; therefore, early concurrence on the technical issues addressed here will minimize the report comment and revision cycle.

1.2 Requirements of the Interagency Agreement (IAG)

In accordance with the requirements of the IAG, the OU 15 Phase I RFI/RI includes IHSSs 178, 179, 180, 204, 211 and 217. OU 15 was originally comprised of eight IHSSs; however, IHSSs 212 and 215 are no longer included as part of this investigation. The closure of IHSS 212 is now addressed in Part VIII of the RFP RCRA Mixed Residue Permit Modification. If any corrective action under the Comprehensive Environmental Response, Compensation and Liability Act is necessary, the work will be performed pursuant to the IAG, including the issuance of a decision document to close the unit. IHSS 215 was transferred to OU 9 in a Modification to Work of the IAG dated April 21, 1992, and has already been included in the Phase I RFI/RI for OU 9.

The Final Phase I RFI/RI Work Plan (dated March 23, 1993) was approved for OU 15, fulfilling the first requirement of the IAG regarding the Phase I RFI/RI. Following completion of the Phase I RFI/RI work, the Draft Phase I RFI/RI Report must be submitted by the IAG milestone date of August 1, 1994. The Draft Phase I RFI/RI Report must contain a Preliminary Site Characterization Summary describing the OU, and the nature and extent of contamination with data sufficient to support the BRA for OU 15. The Draft Phase I RFI/RI Report must also contain the BRA, and an identification of any releases from the OU (or IHSSs within the OU) and any areas which may have been impacted by such releases. The Final Phase I RFI/RI Report must be submitted by the IAG milestone date of January 4, 1995. If it is determined that no additional investigation is required at OU 15, the Final Phase I RFI/RI Report for OU 15 will become the Final RFI/RI Report. Otherwise, a second phase of investigation will be initiated.

In accordance with the IAG, additional investigation at an IHSS within OU 15 will be performed if:

1. There has been a release of hazardous constituents or hazardous substances to the environment external to the IHSS, or

2. There is a threat of post-closure escape of hazardous waste, hazardous constituents, leachates, run-off, hazardous waste decomposition products or hazardous substances.

Prior to submission of the Draft Phase I RFI/RI report, the IAG requires that DOE submit to EPA and CDH a series of four technical memoranda describing the BRA, including:

1. Contaminant Identification and Documentation;
2. Exposure Assessment and Documentation;
3. Toxicity Assessment and Documentation; and
4. Risk Characterization.

This document (TM#1) fulfills the requirements of submittal of the first and second technical memoranda listed above for indoor exposures. In addition, it meets the Work Plan requirement of submittal of a FSP Technical Memorandum describing the field sampling activities and results.

1.3 Scope of Work

The scope of work for the Phase I RFI/RI at OU 15 was approved in the Final Phase I RFI/RI Work Plan, dated March 23, 1993. This section briefly describes the key work elements contained in the Work Plan.

Sampling and inspection activities were conducted from April 23, 1993 to November 9, 1993 for Stage I and II of the OU 15 Phase I RFI/RI at the following IHSSs:

IHSS 178	Building 881, Drum Storage Area (Room 165)
IHSS 179	Building 865, Drum Storage Area (Room 145)
IHSS 180	Building 883, Drum Storage Area (Room 104)

IHSS 204 Unit 45, Original Uranium Chip Roaster (Building 447, Rooms 32 and 502)

IHSS 211 Unit 26, Building 881, Drum Storage Area (Room 266B)

IHSS 217 Unit 32, Cyanide Bench Scale Treatment (Building 881, Room 131C)

The Phase I RFI/RI investigation included surface sampling for chemical and radiological contamination in each of the above IHSSs, but did not include collection of any samples of environmental media (soil, air, water). Analytical parameters were selected for each IHSS based on the previous uses of the IHSS, and included volatile and semi-volatile organic compounds, metals, cyanide and radionuclides.

Samples were obtained from surfaces (i.e., floors and structures) within each IHSS, as well as in areas defined as "perimeter" and "pathway" areas. Perimeter and pathway areas were selected to determine if contamination from within an IHSS had migrated out of the IHSS. The data collected at each sampling location included hot water rinsate samples, beryllium and radiological smear samples, and fixed radiation surveys.

The details of the scope of work for the OU 15 Phase I RFI/RI are presented in the Work Plan and are discussed in Section 2.0 of this document.

1.4 Report Organization

Section 2.0 of this document summarizes the FSP previously presented in full in the Work Plan. Section 3.0 presents the results of the field sampling effort on an IHSS-by-IHSS basis. The analytical results for chemical and radiological analyses are presented for each IHSS in Sections 3.1 through 3.6. Section 4.0 presents the selection process used for identifying constituents of concern (COCs), along with the specific COCs for each IHSS. Section 5.0 presents the

Exposure Assessment for OU 15. Its primary focus is the determination of screening levels for chemical and radiological data. In addition, Section 5.0 presents the evaluation of potentially exposed populations and exposure parameters within the OU 15 IHSSs. Section 6.0 contains the analysis of the data collected for each IHSS and presents, on an IHSS-by-IHSS basis, the evaluation of the clean closure requirements and the determination of the need for Stage III (outdoor) investigation. Finally, Section 7.0 contains the schedule for performing additional OU 15 activities.

Section 2.0

2.0 *METHODS*

This section summarizes the sampling and analytical activities completed during the combined Stage I and II field investigation for OU 15. It provides a description of the sampling, analytical and quality assurance/quality control (QA/QC) procedures that were followed during the implementation of Stage I and II of the FSP. Additional detail on the FSP is provided in Section 7.0 of the Work Plan.

2.1 *Sampling Plan*

Sampling activities for the OU 15 combined Stage I and II field work were conducted from April 23, 1993 to November 9, 1993. Field activities consisted of contaminant characterization within the IHSS, around the perimeter of the IHSS, and along pathways leading away from the IHSS. The term pathway is used to describe the area outside the perimeter of the IHSS that might have been impacted by spilled material migrating out of the IHSS. Activities performed as part of the investigation included:

- Review of new and/or additional information;
- Visual inspection and documentation of current conditions; and
- Sampling and analysis of surfaces within each IHSS area.

Visual inspections were performed to more completely assess the configuration of the units, to identify the presence and condition of berms or other secondary containment systems, and to document the conditions of the floors with respect to cracks and/or worn areas that might represent contaminant migration pathways. In addition, the visual inspections noted the slopes of the floor, and the presence of any sumps or drains. Visual inspections were performed at each IHSS prior to sampling activities.

Sampling was conducted to characterize contamination within the IHSS, perimeter, and pathway areas. Smear sampling for removable radiological (alpha and beta) and, if appropriate, beryllium contamination was performed first. This was followed by hot water sampling and rinsate analysis for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semi-volatile organic compounds, Target Analyte List (TAL) dissolved metals, dissolved radionuclides, and cyanide, as appropriate for the individual IHSSs. Finally, removable alpha, beta, and (if applicable) beryllium analyses, fixed alpha and beta analyses, and beta and gamma dose-rate surveys were performed, as appropriate for the individual IHSSs.

The combined Stage I and II investigation programs for each IHSS are summarized in Table 2-1. The table details the field sampling and analysis completed for each IHSS. Additional information regarding the number and location of radiological and hot water rinsate samples collected for each IHSS is included in the following subsections. A legend describing the symbols and abbreviations used on the sample location drawings is provided as Figure 2-1.

2.1.1 *IHSS 178 - Building 881 Drum Storage Area*

Following the review of new data and information, and after the visual inspection of IHSS 178, 30 radiological smear samples were collected at the locations shown in Figure 2-2. Three hot water rinsate samples were then obtained from the IHSS, perimeter, and pathway areas as shown in Figure 2-3. Final radiological surveys at each of the 30 initial smear sample locations shown in Figure 2-2 completed the Stage I and II field investigation of IHSS 178.

2.1.2 *IHSS 179 - Building 865 Drum Storage Area*

Following the review of new data and information, and after the visual inspection of IHSS 179, 23 radiological and beryllium smear samples were collected at the locations shown in Figure 2-4.

Three hot water rinsate samples were then obtained from the IHSS, perimeter, and pathway areas as shown in Figure 2-5. Final radiological surveys at each of the 23 initial smear sample locations shown in Figure 2-4 completed the Stage I and II field investigation of IHSS 179.

2.1.3 *IHSS 180 - Building 883 Drum Storage Area*

Following the review of new data and information, and after the visual inspection of IHSS 180, 49 radiological and beryllium smear samples were collected at the locations shown in Figure 2-6. Four hot water rinsate samples were then obtained from the IHSS, perimeter, and pathway areas as shown in Figure 2-7. The weigh scale located adjacent to the IHSS was not disassembled to perform either hot water rinsate or radiological sampling beneath the scale plate. Final radiological surveys at each of the 49 initial smear sample locations shown in Figure 2-6 completed the Stage I and II field investigation of IHSS 180.

2.1.4 *IHSS 204 - Unit 45, Original Uranium Chip Roaster*

Following the review of new data and information, and after the visual inspection of IHSS 204, radiological smear samples were collected from the areas that comprise IHSS 204. Thirty-three smear samples were collected from the floor in Rooms 31 and 32, and one sample was collected from the exterior surface of the oxide outlet of the Original Uranium Chip Roaster, at the locations shown in Figure 2-8. Thirty-one smear samples were collected from the floor in Rooms 501 and 502, and two samples were collected from the exterior surface of the chip inlet of the Original Uranium Chip Roaster, at the locations shown in Figure 2-9. Ten smear samples were also collected from the Wash Rack/Drum Washing Basin in Room 501 as shown in Figure 2-10.

Seven hot water rinsate samples were obtained from the areas that comprise IHSS 204. One rinsate sample was collected from the floor in Room 31, one sample was collected from the floor in Room 32, and one sample was collected from the exterior surface of the oxide outlet of the Original Uranium Chip Roaster, at the locations shown in Figure 2-11. One rinsate sample was collected from the floor in Room 501, one sample was collected from the floor in Room 502, and one sample was collected from the exterior surface of the chip inlet of the Original Uranium Chip Roaster, at the locations shown in Figure 2-12. One rinsate sample was also collected from the Wash Rack/Drum Washing Basin in Room 501 as shown in Figure 2-13. In accordance with the requirements of the Work Plan, no final radiological surveys were performed for IHSS 204.

2.1.5 *IHSS 211 - Unit 26, Building 881 Drum Storage Area*

Following the review of new data and information, and after the visual inspection of IHSS 211, 32 radiological smear samples were collected at the locations shown in Figure 2-14. Three hot water rinsate samples were then obtained from the IHSS, perimeter, and pathway areas as shown in Figure 2-15. Final radiological surveys at each of the 32 initial smear sample locations shown in Figure 2-14 completed the Stage I and II field investigation of IHSS 211.

2.1.6 *IHSS 217 - Unit 32, Cyanide Bench Scale Treatment*

Following the review of new data and information, and after the visual inspection of IHSS 217, 5 radiological smear samples were collected from the floor adjacent to the laboratory table (perimeter) and 8 samples were collected from the laboratory table and fume hood (IHSS) at the locations shown in Figures 2-16 and 2-17, respectively. One hot water rinsate sample was then obtained from each of these areas as shown in Figures 2-18 and 2-19. Final radiological surveys at each of the 13 initial smear sample locations shown in Figures 2-16 and 2-17 completed the Stage I and II field investigation of IHSS 217.

2.2 Sample Collection and Field Analysis Procedures

This section describes the procedures used to collect radiological and beryllium smear samples, and hot water rinsate samples, and to perform the final radiological surveys during the Stage I and II field investigations.

2.2.1 Smear Sample Collection

Each IHSS, along with its associated perimeter and pathway areas, was divided into one square meter sampling areas. Smear paper was used to collect a smear sample within each square meter by being rubbed on the surface of the square to cover an area of approximately 100 square centimeters. All smear samples were obtained according to procedures outlined in Environmental Management Radiological Guidelines (EMRG) 3.1 (Performance of Surface Contamination Surveys). For the smear sample analysis, alpha counting was performed on an Eberline SAC-4 Alpha-Scintillation Smear Counting Instrument and beta counting was performed on an Eberline BC-4 Beta Smear Counting Instrument. All smear samples from IHSS 179 and IHSS 180 were also analyzed for beryllium using the on-site beryllium counter. Results were recorded on data sheets by EG&G Radiation Protection Technologists (RPTs) for the radiological smear samples and by EG&G Industrial Hygiene technicians for the beryllium smear samples.

2.2.2 Hot Water Rinsate Sample Collection

Hot water rinsate samples were collected in accordance with EG&G SOP (Standard Operating Procedure) FO.27 (Collection of Floor/Equipment Hot Water Rinsate Samples). The hot water rinsate sample collection system designed for use during the OU 15 field investigation consisted of a series of modular components which were divided into two major groups. The first equipment group was comprised of a spray applicator and vacuum head, an interceptor can/receiver, and associated connecting hoses and fittings. A set of this equipment was dedicated to each of the IHSSs sampled to prevent cross-contamination between IHSSs. The second equipment group consisted of a hot water reservoir and heater, a High Efficiency Particulate Air vacuum unit, an activated carbon adsorption unit, and associated connecting hoses and fittings. This equipment was reused for all of the IHSSs sampled, since the equipment was remotely positioned outside of the IHSS and potentially contaminated areas. A schematic of the hot water rinsate sample collection system is shown in Figure 2-20.

The hot water spray was applied to and vacuumed from the sample areas in a manner which allowed the entire sample area to be uniformly covered. Hot water was applied at the rate necessary to generate enough sample volume to perform the required sample analyses. In all cases, however, the application rate was kept below 0.17 gallons per square foot to avoid an unrepresentative dilution of the sample.

The hot water rinsate samples were collected from the rinsate sample bag located in the interceptor can/receiver. Sample collection procedures were followed as specified in EG&G SOP FO.27. The approximate volume of sample was determined by weighing the sample bag and its contents; field parameters including pH, temperature, and conductivity (specific conductance) were measured in accordance with EG&G SOP SW.2 (Field Measurement of Surface Water). Any unusual observations about the liquid, including color or odor were recorded in the field book. All chain of custody forms and field documentation were completed in accordance with the requirements of EG&G SOP FO.13 (Containerizing, Preserving, Handling, and Shipping Soil and Water Samples) and the Work Plan.

2.2.3 *Final Radiological Surveys*

Removable alpha, beta, and, if applicable, beryllium analyses; fixed alpha and beta radiological surveys; and beta and gamma dose rate surveys were performed for each of the one square meter areas sampled during the initial smear sample collection, with the exception of those associated with IHSS 204. The final radiological surveys were conducted and recorded as specified in EMRG 1.1 (Gamma Radiation Surveys), 1.2 (Beta Radiation Surveys), and 3.1 (Performance of Surface Contamination Surveys). A Ludlum Model 12-1A count-rate instrument was used for measuring direct alpha activity and a Ludlum Model 31 was used for direct measurement of beta activity. The detectors were held within approximately 1/4 inch of the surface for the alpha surveys, and within 1/2 inch of the surface for the beta surveys. In both cases the detectors were held in place for at least 5 seconds in order to take the measurement.

For the smear sample analysis, alpha counting was performed on an Eberline SAC-4 Alpha-Scintillation Smear Counting Instrument and beta counting was performed on an Eberline BC-4 Beta Smear Counting Instrument. All smear samples from IHSS 179 and IHSS 180 were also analyzed for beryllium using the on-site beryllium counter. Beta and gamma dose-rate surveys were performed using a Victoreen 450B instrument, which was held within 30 centimeters or less of the surface being surveyed. Results were recorded on data sheets by EG&G RPTs for the radiological smear samples and surveys, and by EG&G Industrial Hygiene technicians for the beryllium smear samples.

2.3 ***Chemical and Radionuclide Laboratory Analysis Methods***

Hot water rinsate samples obtained during Stage I and II of the OU 15 Phase I RFI/RI were analyzed for some or all of the following parameters:

- TAL dissolved metals
- TCL VOCs
- TCL semi-volatile organic compounds
- dissolved radionuclides
- cyanide

The specific analytes and detection/quantification limits for the OU 15 Phase I RFI/RI are identified in the Work Plan by reference to EPA Contract Laboratory Program (CLP) analyses and the General Radiochemistry and Routine Analytical Services Protocol (GRRASP) (EG&G, 1991). Part A of the GRRASP provides hazardous substance list analytes and limits using CLP methods. Part B of the GRRASP provides analytes and detection limits for radionuclides.

2.4 *Data Quality Assurance/Quality Control*

Four types of QA/QC samples were collected for the hot water rinsate sampling in accordance with the requirements of Section 6.3 of EG&G SOP FO.27. The hot water source or field blanks (taken from the field water source prior to being used for rinsate generation), sample duplicates, equipment blanks, and trip blanks were analyzed for the same constituents as their associated real samples. A summary of all individual hot water rinsate and QA/QC samples collected is provided in Table 2-2 and is sorted by IHSS. In Building 881, the same hot water source was used for sampling IHSSs 178, 211 and 217; therefore, only one hot water source sample was collected. Since IHSSs 179, 180 and 204 each had a different hot water source, one sample was collected from each source.

2.5 *Data Processing and Storage*

Hot water rinsate samples collected from floor areas and designated equipment were assigned a sequential number based on the order in which they were collected. Each sample and associated location was marked on the corresponding IHSS diagram, measured relative to IHSS structures, and was described in the designated field book.

A block of sample numbers was assigned by EG&G Environmental Restoration Sample Management for the OU 15 Phase I RFI/RI hot water rinsate samples, in order to maintain consistency with the Rocky Flats Environmental Database System (RFEDS) sample numbering system. The RFEDS sample numbers consist of a two digit sample prefix which indicates the sample type, a five digit serial number which identifies the sample, and a suffix which identifies the contractor collecting the sample. For example, the sample number BU00011ER indicates a Building sample (BU), serial number eleven (00011), collected by ERM-Rocky Mountain, Inc. (ER).

Location codes have also been established in RFEDS for each sample. Each location code consists of seven digits and describes where its associated sample was collected. The first three digits in each location code identify the building in which the IHSS is located, the second three digits represent the particular IHSS, and the last digit indicates the sample area (e.g., the IHSS [1], perimeter [2] or pathway [3]). For example, the location code 8811782, identifies that the sample was collected from the perimeter area of IHSS 178 in Building 881. For IHSS 204, a different set of numbers was used to designate the sample area (the last digit in the location code), due to the greater number and variety of hot water rinsate sampling locations. Sample area identifiers for IHSS 204 were defined as follows: The Wash Rack/Drum Washing Basin (1), the floor in Room 501 (2), the floor in Room 502 (3), the chip inlet (4), the floor in Room 31 (5), the floor in Room 32 (6), and the oxide outlet (7).

Data collected during the initial radiological and beryllium smear sampling, and the final radiological surveys was recorded directly on data sheets by EG&G RPTs and Industrial Hygiene technicians. Sample/survey locations were determined based on the layout of one square meter grids. For each IHSS, the position of the sampling/survey squares was plotted on the IHSS diagram and numbered sequentially. Sample/survey results were then identified and tracked by this numbering scheme. Given current system limitations this data was not transferred to RFEDS. Data generated from both the radiological sampling and surveys, and the hot water rinsate sampling was managed in accordance with the prescribed QA/QC procedures described in EG&G SOP FO.14 (Field Data Management).

Table 2-1
OU 15 Field Investigation Activities

			Smear Sampling		Hot Water Rinsate Sampling/Analysis					Final Radiological Surveys			
										Smear Samples			
IHSS	Data Review	Visual Inspection	Rads	Be	VOCs	Semi-VOCs	Rads	Metals	Cyanide	Rads	Be	Fixed	Dose-Rate
178	X	X	X		X	X	X			X		X	X
179	X	X	X	X	X	X	X			X	X	X	X
180	X	X	X	X	X	X	X			X	X	X	X
204	X	X	X		X	X	X						
211	X	X	X		X	X	X	X		X		X	X
217	X	X	X		X	X	X	X	X	X		X	X

Table 2-2
Summary of Hot Water Rinsate Real & QA/QC Samples

IHSS	Date Sampled	Hot Water Rinsate Sample	Field Blank	Sample Duplicate	Trip Blank	Equipment Blank
178	08/16/93	BU00011ER (IHSS)	BU00001ER (From tap in Room 261)	BU00012ER	BU00010ER	BU00013ER
		BU00014ER (Perimeter)	---	---	---	---
		BU00015ER (Pathway)	---	---	---	---
179	09/15/93	BU00033ER (Perimeter)	BU00032ER (From tap in Room 145)	BU00034ER	BU00031ER	BU00035ER
		BU00036ER (IHSS)	---	---	---	---
		BU00037ER (Pathway)	---	---	---	---
180	09/01/93	BU00023ER (IHSS)	BU00022ER (From tap in Room 104)	BU00024ER	BU00021ER	BU00025ER
		BU00026ER (Perimeter)	---	---	---	---
	09/02/93	BU00027ER (Pathway)	---	BU00028ER	---	BU00029ER
		BU00030ER (Pathway)	---	---	---	---

Table 2-2
Summary of Hot Water Rinsate Real & QA/QC Samples

IHSS	Date Sampled	Hot Water Rinsate Sample	Field Blank	Sample Duplicate	Trip Blank	Equipment Blank
204	10/11/93	BU00040ER (Wash Rack)	BU00039ER (From tap in Room 501)	BU00041ER	BU00038ER	BU00042ER
		BU00043ER (Rm 501 Perimeter)	---	---	---	---
		BU00044ER (Rm 502 IHSS)	---	---	---	---
		BU00045ER (Chip Inlet)	---	---	---	---
	11/09/93	BU00047ER (Rm 31 Perimeter)	---	BU00048ER	BU00046ER	BU00049ER
		BU00050ER (Rm 32 IHSS)	---	---	---	---
		BU00051ER (Oxide Outlet)	---	---	---	---

Table 2-2
Summary of Hot Water Rinsate Real & QA/QC Samples

IHSS	Date Sampled	Hot Water Rinsate Sample	Field Blank	Sample Duplicate	Trip Blank	Equipment Blank
211	08/09/93	BU00002ER (IHSS)	BU00001ER (From tap in Room 261)	BU00003ER	BU00005ER	BU00004ER
	08/11/93	BU00006ER (Perimeter)	---	---	---	BU00007ER
		BU00008ER (Pathway)	---	BU00009ER	---	---
217	08/17/93	BU00017ER (IHSS)	BU00001ER (From tap in Room 261)	BU00018ER	BU00016ER	BU00019ER
		BU00020ER (Perimeter)	---	---	---	---

DRAWING LEGEND

1	SMEAR SAMPLE/FINAL RADIOLOGICAL SURVEY LOCATION
1	SMEAR SAMPLE/FINAL RADIOLOGICAL SURVEY NUMBER
BU00050ER 4472046	HOT WATER RINSATE SAMPLE LOCATION
BU00050ER	HOT WATER RINSATE SAMPLE NUMBER
4472046	HOT WATER RINSATE SAMPLE LOCATION CODE
	IHSS LOCATION PAINTED ON FLOOR
	ROOM/EQUIPMENT BOUNDARY
CL	COLUMN
	DOOR
	OBSTRUCTED SPACE BOUNDARY
EW	EYE WASH
	PUMP
Σ	HEATING ELEMENT

ABBREVIATIONS

ACT	ACTIVATED
BLDG	BUILDING
DIA	DIAMETER
EB	ELECTRON BEAM
HEPA	HIGH EFFICIENCY PARTICULATE AIR
NO	NUMBER
RAD	RADIOLOGICAL
VAC	VOLTS–ALTERNATING CURRENT

KEYWORDS	ISSUE	DESCRIPTION	DATE				
1.OU 15	A	ORIGINAL ISSUE	XX/XX/93	RCH	KAS	PRB	DLS
2.PHASE I							
3.RFI/RI							
4.TECH MEMO							
5.NUMBER 1							
BLDG./FACILITY SITE							
ROOM/AREA GEN							
GRID COOR./COL NO.							

DESIGNED	HEA	XX/XX/93
DRAWN	SCHACKLIN	12/21/93
CHECKED	BIERBAUM	XX/XX/93
APPROVED	SCHUBBE	XX/XX/93
SUBMITTED	BIERBAUM	XX/XX/93
APPROVED RFP		
APPROVED DOE		

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO

Rocky Flats Plant

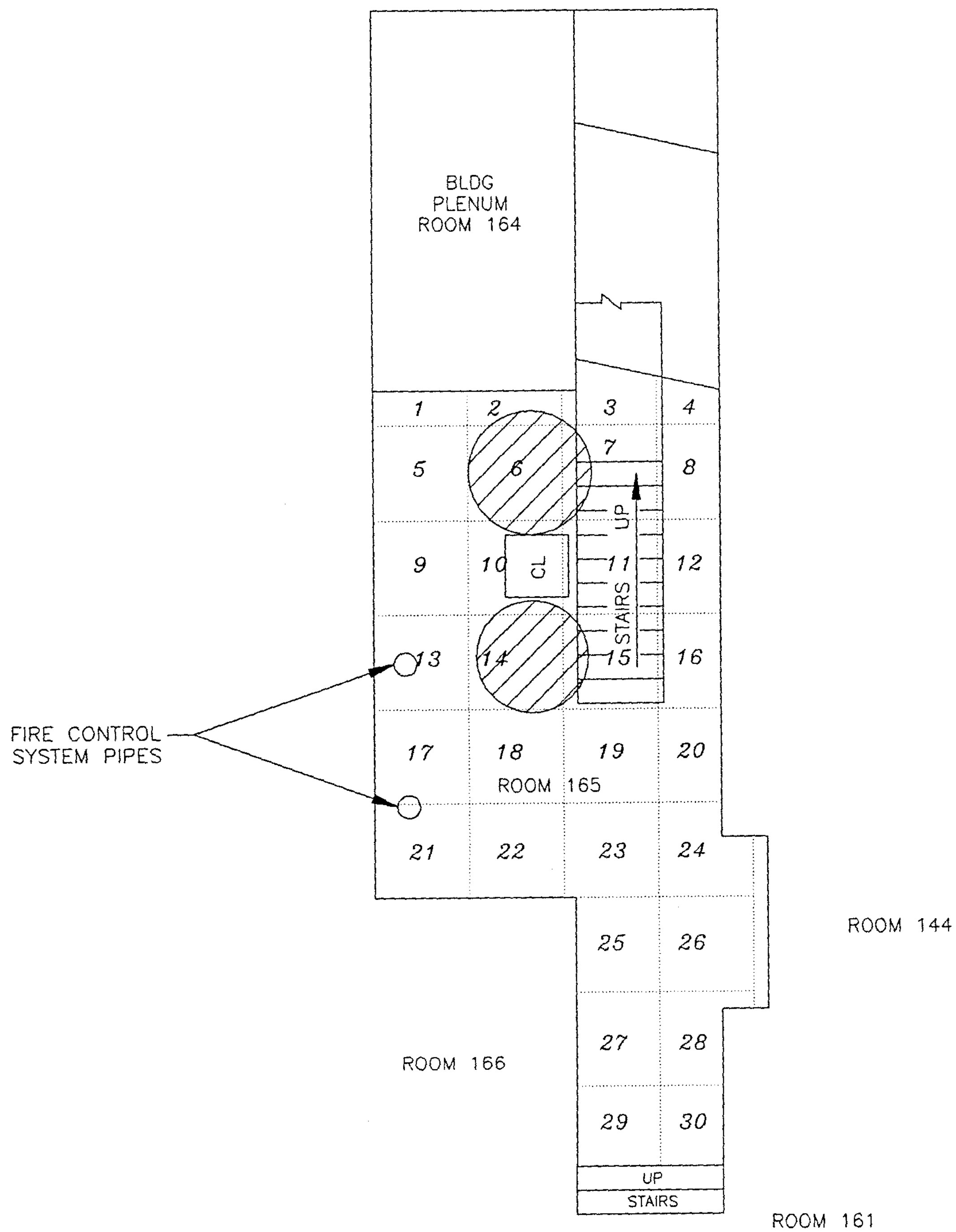
GOLDEN,COLORADO 80401

OU 15 PHASE I RFI/RI

DRAWING LEGEND AND ABBREVIATIONS

MASTER YES ☐ NO ☒ | SCALE: NONE | SIZE B | DRAWING NUMBER | ISSUE A | FIGURE 2-1

SITE
BLDG/FAC
GEN
ROOM/AREA
H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
Inst
B Building
T Title
C Civil
U Utilities
P Piping
F Fire Prot.
L Layouts
F Flow Diag
S Stds
X Alarms

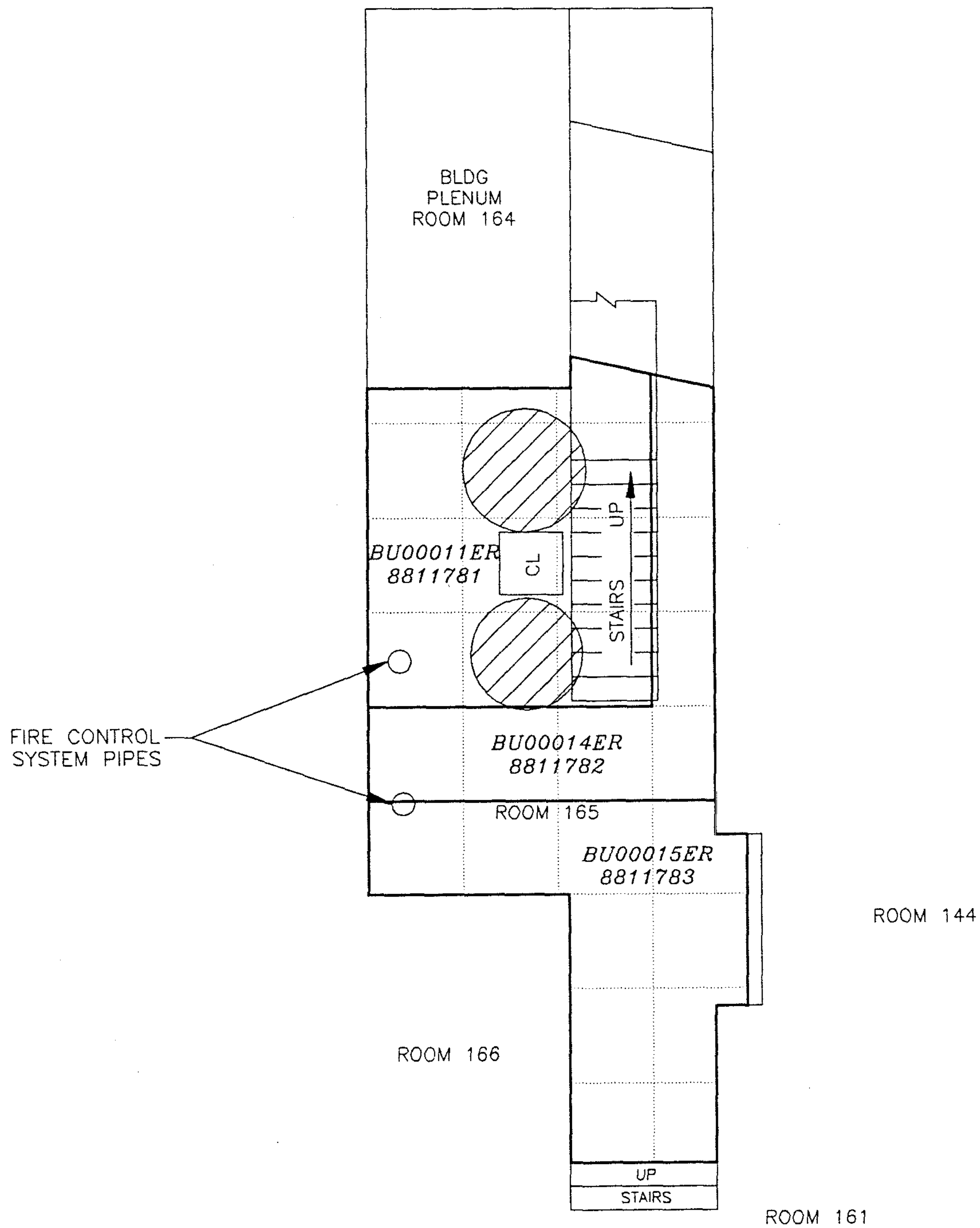


KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	PRB	DLS			
1.OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.

2.PHASE I	DESIGNED	HEA	XX/XX/93	U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO
3.RFI/RI	DRAWN	LENNIE	12/21/93	Rocky Flats Plant
4.TECH MEMO	CHECKED	BIERBAUM	XX/XX/93	
5.NUMBER 1	APPROVED	SCHUBBE	XX/XX/93	GOLDEN,COLORADO 80401
BLDG./FACILITY 881				OU 15 PHASE I RFI/RI
ROOM/AREA 165				IHSS 178 RAD SAMPLE LOCATIONS
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE		

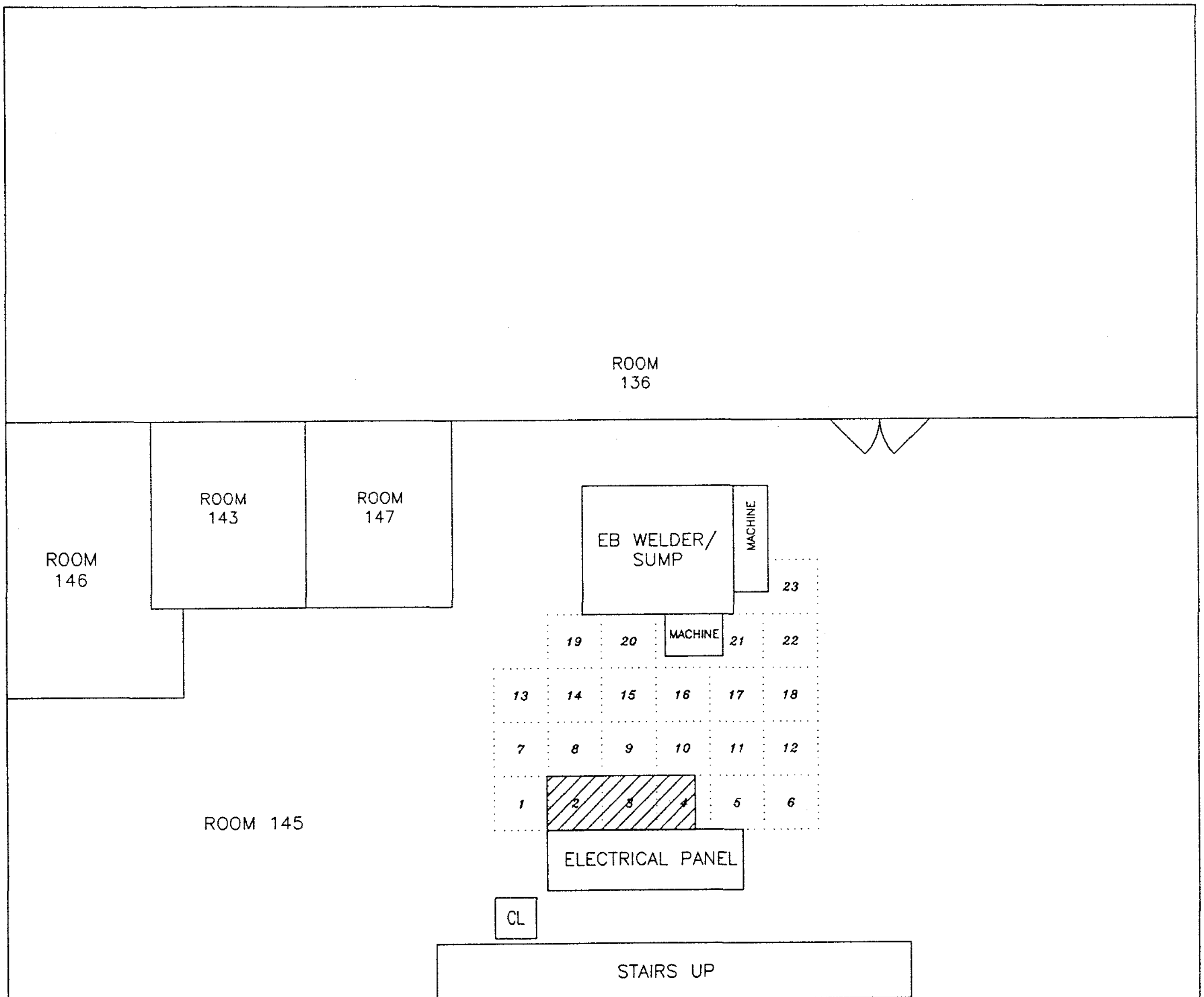
SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 178	A	2-2

881
BLDG/FAC
165
ROOM/AREA



KEYWORDS	A	ORIGINAL ISSUE			XX/XX/93	RCH	SRL	PRB	DLS		
1.OU 15	ISSUE	DESCRIPTION			DATE	RFP			DOE	CLASS	JOB NO.
2.PHASE I					U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO						
3.RFI/RI		DESIGNED	HEA	XX/XX/93							
4.TECH MEMO		DRAWN	LENNIE	12/21/93	Rocky Flats Plant						
5.NUMBER 1		CHECKED	BIERBAUM	XX/XX/93							
BLDG./FACILITY 881		APPROVED	SCHUBBE	XX/XX/93	GOLDEN,COLORADO 80401						
ROOM/AREA 165					OU 15 PHASE I RFI/RI						
GRID COOR./COL NO.					IHSS 178 RINSATE SAMPLE LOCATIONS						
		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER			ISSUE	FIGURE	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 178			A	2-3	

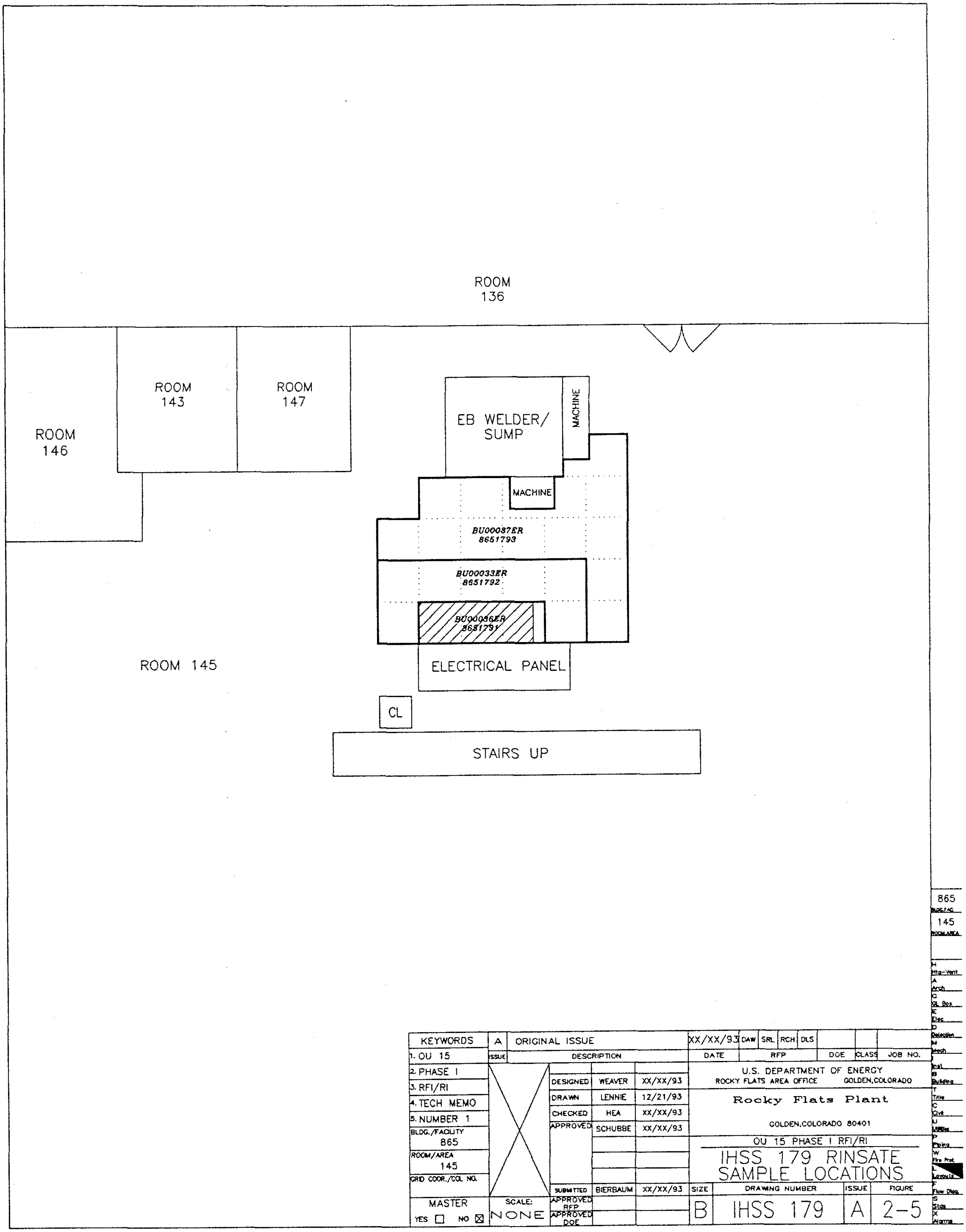
881
BLDG/AC
165
ROOM/AREA
H Htg-Vent
A Arch
C CL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag
S Stds
X Alarms

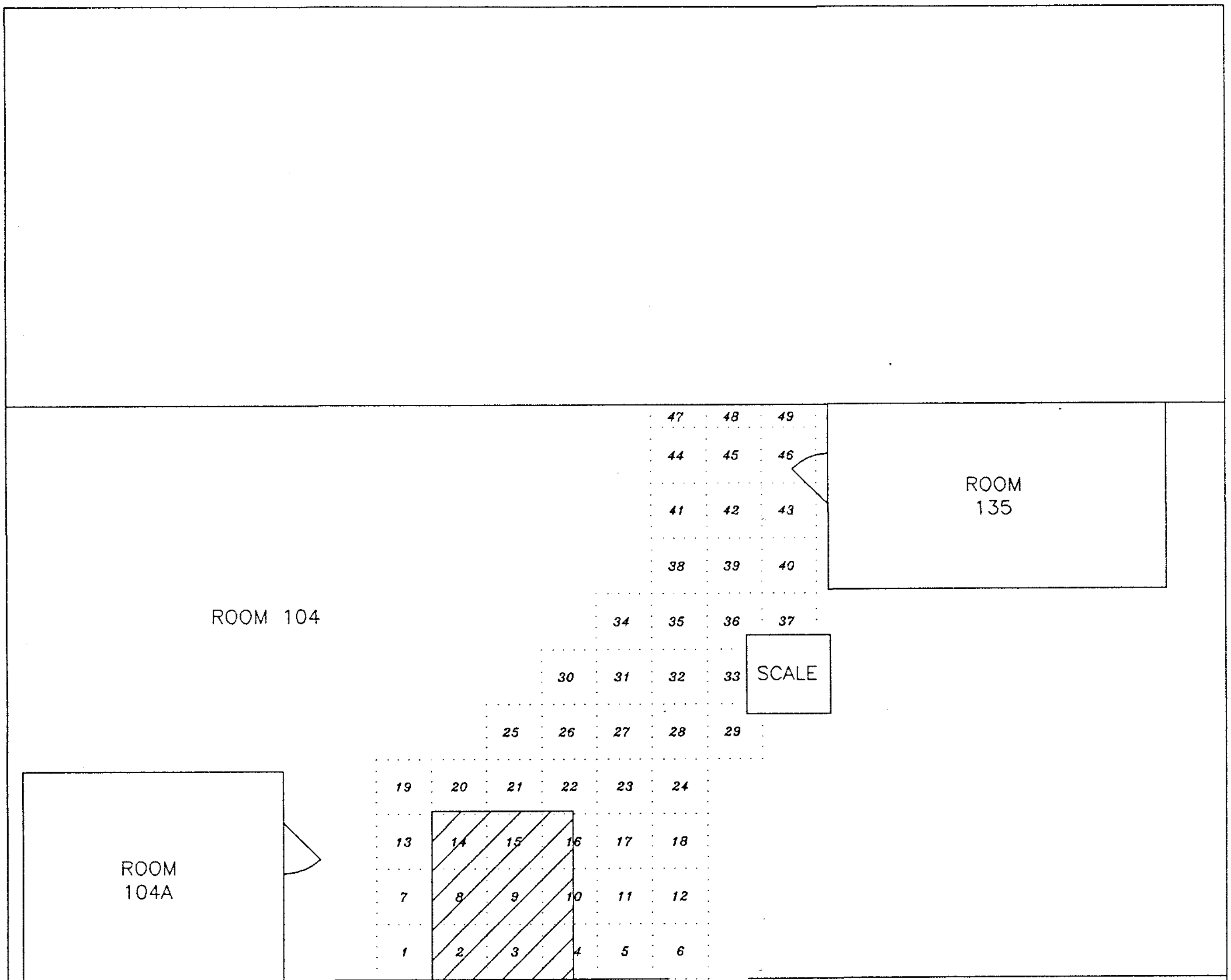


KEYWORDS	A	ORIGINAL ISSUE			XX/XX/93	DAW	SRL	RCH	DLS		
1.OU 15	ISSUE	DESCRIPTION			DATE	RFP				DOE	CLASS / JOB NO.
2.PHASE I					U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO						
3.RFI/RI		DESIGNED	WEAVER	XX/XX/93	Rocky Flats Plant						
4.TECH MEMO		DRAWN	LENNIE	12/21/93							
5.NUMBER 1		CHECKED	HEA	XX/XX/93	GOLDEN,COLORADO 80401						
BLDG./FACILITY 865		APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI						
ROOM/AREA 145					IHSS 179 RAD SAMPLE LOCATIONS						
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER				ISSUE	FIGURE
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 179				A	2-4

865
BLDG/FAC
145
ROOM/AREA

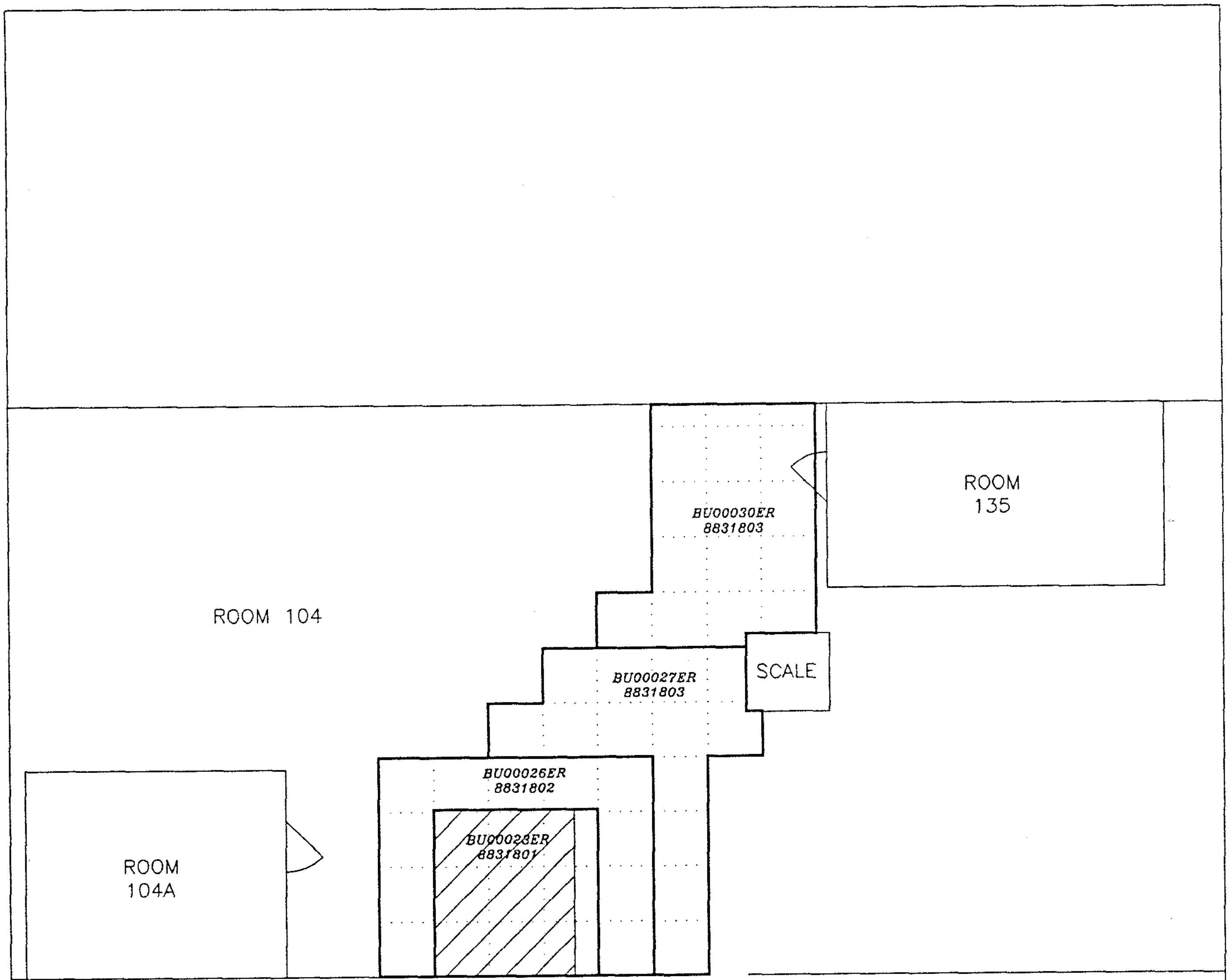
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layout
F Flow Diag.
S Stds
X Alarms


ROOM 136
ROOM 143
ROOM 147
ROOM 146
EB WELDER/ SUMP
MACHINE
MACHINE
BU00087ER 8651793
BU00033ER 8651792
BU00036ER 8651791
ROOM 145
ELECTRICAL PANEL
CL
STAIRS UP
865
145
H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
J Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot
L Layouts
F Flow Diag.
S Stds
X Warms
KEYWORDS
1. OU 15
2. PHASE I
3. RFI/RI
4. TECH MEMO
5. NUMBER 1
BLDG./FACILITY 865
ROOM/AREA 145
GRID COOR./COL NO.
MASTER
YES ☐ NO ☒
SCALE: NONE
A ORIGINAL ISSUE XX/XX/93 DAW SRL RCH DLS
ISSUE DESCRIPTION DATE RFP DOE CLASS JOB NO.
DESIGNED WEAVER XX/XX/93
DRAWN LENNIE 12/21/93
CHECKED HEA XX/XX/93
APPROVED SCHUBBE XX/XX/93
SUBMITTED BIERBAUM XX/XX/93
APPROVED RFP
APPROVED DOE
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO
Rocky Flats Plant
GOLDEN,COLORADO 80401
OU 15 PHASE I RFI/RI
IHSS 179 RINSATE SAMPLE LOCATIONS
SIZE B
DRAWING NUMBER IHSS 179
ISSUE A
FIGURE 2-5



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	DAW	SRL	RKT	DLS			
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.
2. PHASE I										
3. RFI/RI		DESIGNED	WEAVER	XX/XX/93	U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN, COLORADO					
4. TECH MEMO		DRAWN	LENNIE	12/20/93	Rocky Flats Plant					
5. NUMBER 1		CHECKED	TERRIEN	XX/XX/93	GOLDEN, COLORADO 80401					
BLDG./FACILITY 883		APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI					
ROOM/AREA 104					IHSS 180 RAD SAMPLE LOCATIONS					
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER	ISSUE	FIGURE		
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 180	A	2-6		

883
BLDG/FAC
104
ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Site
X Alarms



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	DAW	SRL	RKT	DLS		
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP			DOE	CLASS	JOB NO.

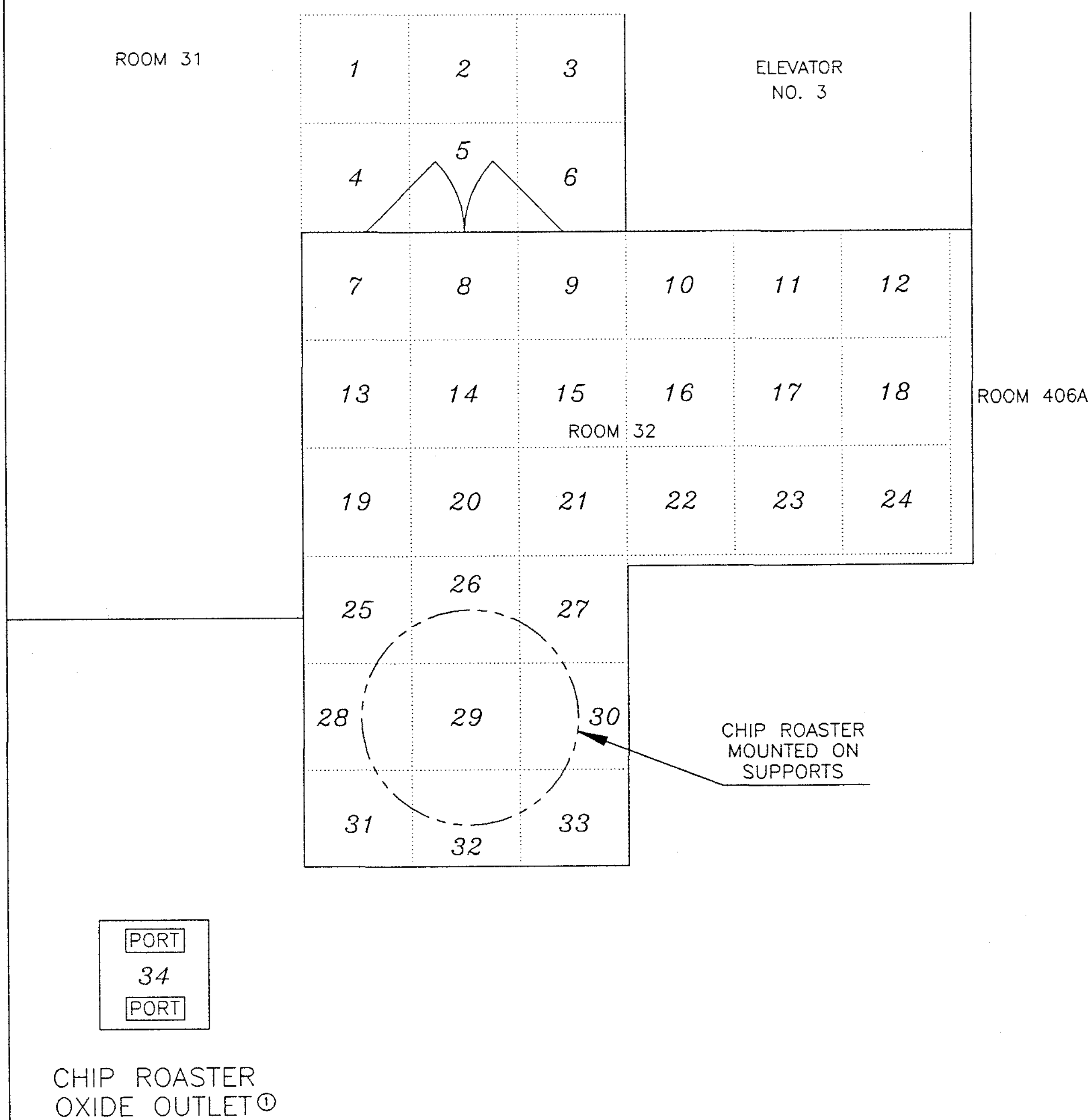
2. PHASE 1				U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN, COLORADO
3. RFI/RI	DESIGNED	WEAVER	XX/XX/93	
4. TECH MEMO	DRAWN	LENNIE	12/20/93	Rocky Flats Plant
5. NUMBER 1	CHECKED	TERRIEN	XX/XX/93	
BLDG./FACILITY 883	APPROVED	SCHUBBE	XX/XX/93	GOLDEN, COLORADO 80401
ROOM/AREA 104				OU 15 PHASE I RFI/RI IHSS 180 RINSATE SAMPLE LOCATIONS
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP APPROVED DOE		

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 180	A	2-7

883
BLDG/FAC
104
ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Misc

NOTES

1. A SMEAR SAMPLE WAS COLLECTED FROM THE SURFACE OF THE CHIP ROASTER AROUND THE OXIDE OUTLET PORTS.

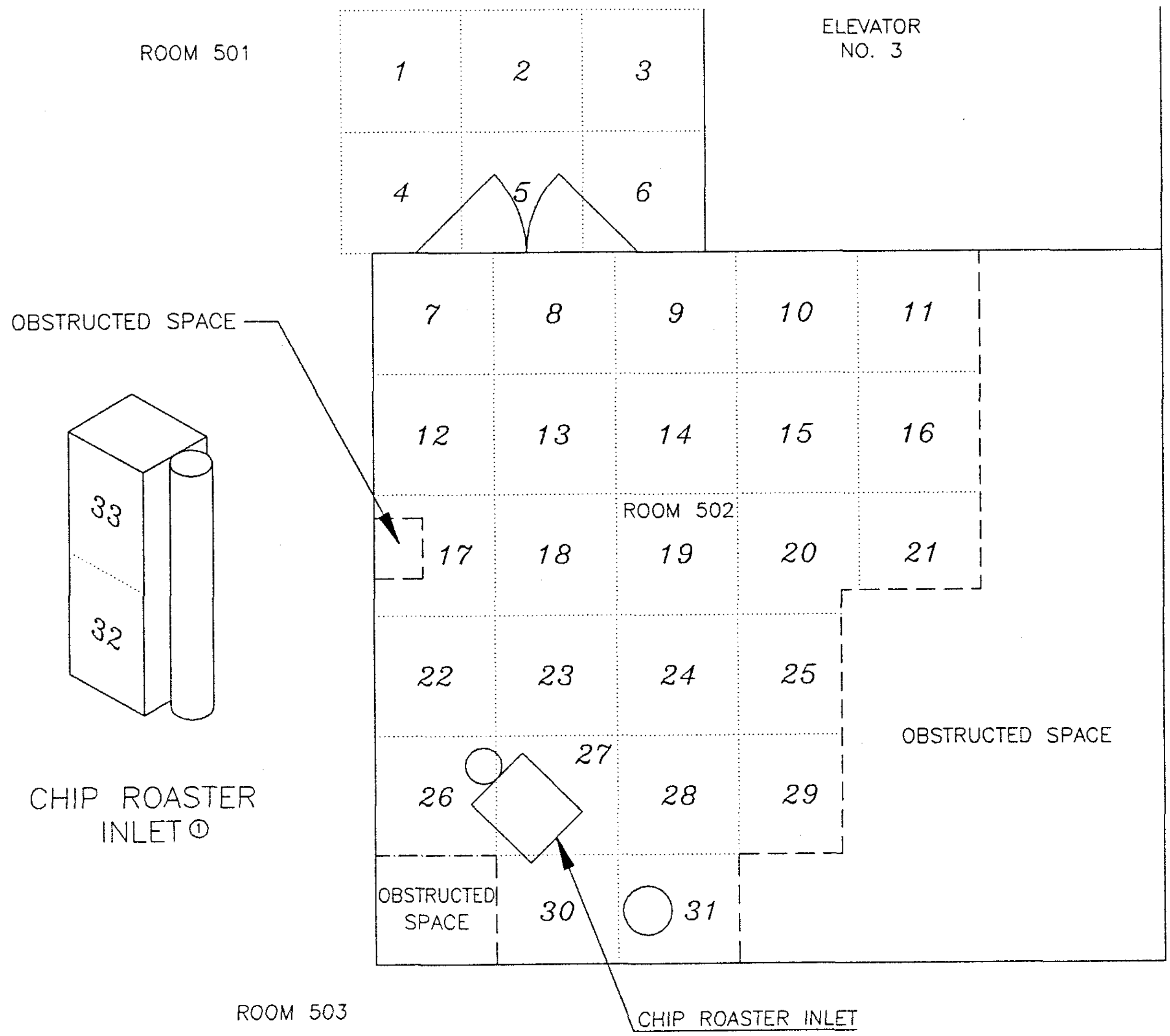


KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	DAW	DLS			
1.OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.
2.PHASE I										
3.RFI/RI		DESIGNED	HEA	XX/XX/93	U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO					
4.TECH MEMO		DRAWN	LENNIE	12/20/93	Rocky Flats Plant					
5.NUMBER 1		CHECKED	WEAVER	XX/XX/93	GOLDEN,COLORADO 80401					
BLDG./FACILITY 447		APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI					
ROOM/AREA 31/32					IHSS 204 RAD SAMPLE LOCATIONS					
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER	ISSUE	FIGURE		
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 204	A	2-8		

447
BLDG/FAC
31/32
ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
N Fire Prot.
L Layout
F Flow Diag.
S Stds
X Alarms

NOTES

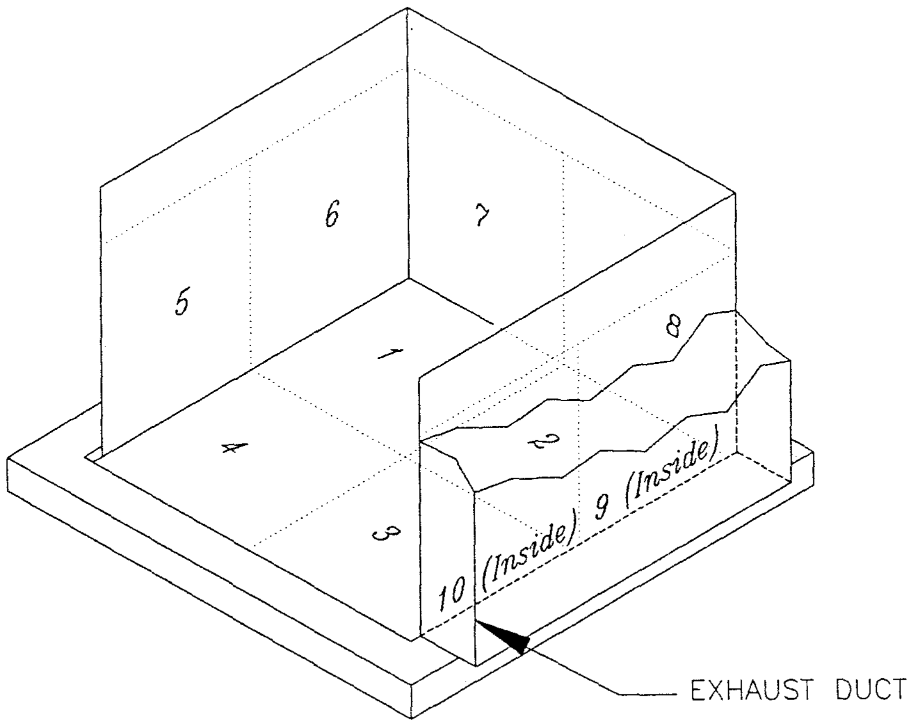
① TWO SMEAR SAMPLES WERE COLLECTED FROM THE SURFACE OF THE CHIP ROASTER INLET.



KEYWORDS	A	ORIGINAL ISSUE			XX/XX/93	RCH	SRL	DAW	DLS
1.OU 15	ISSUE	DESCRIPTION			DATE	RFP		DOE	CLASS / JOB NO.
2.PHASE I					U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO				
3.RFI/RI		DESIGNED	HEA	XX/XX/93	Rocky Flats Plant				
4.TECH MEMO		DRAWN	LENNIE	XX/XX/93					
5.NUMBER 1		CHECKED	WEAVER	XX/XX/93	GOLDEN,COLORADO 80401				
BLDG./FACILITY 447		APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI				
ROOM/AREA 501/502					IHSS 204 RAD SAMPLE LOCATIONS				
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER		ISSUE	FIGURE
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 204		A	2-9

447 BLDG/FAC
502 ROOM/AREA

H Htg-Vent
A Arch
G Gl. Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms



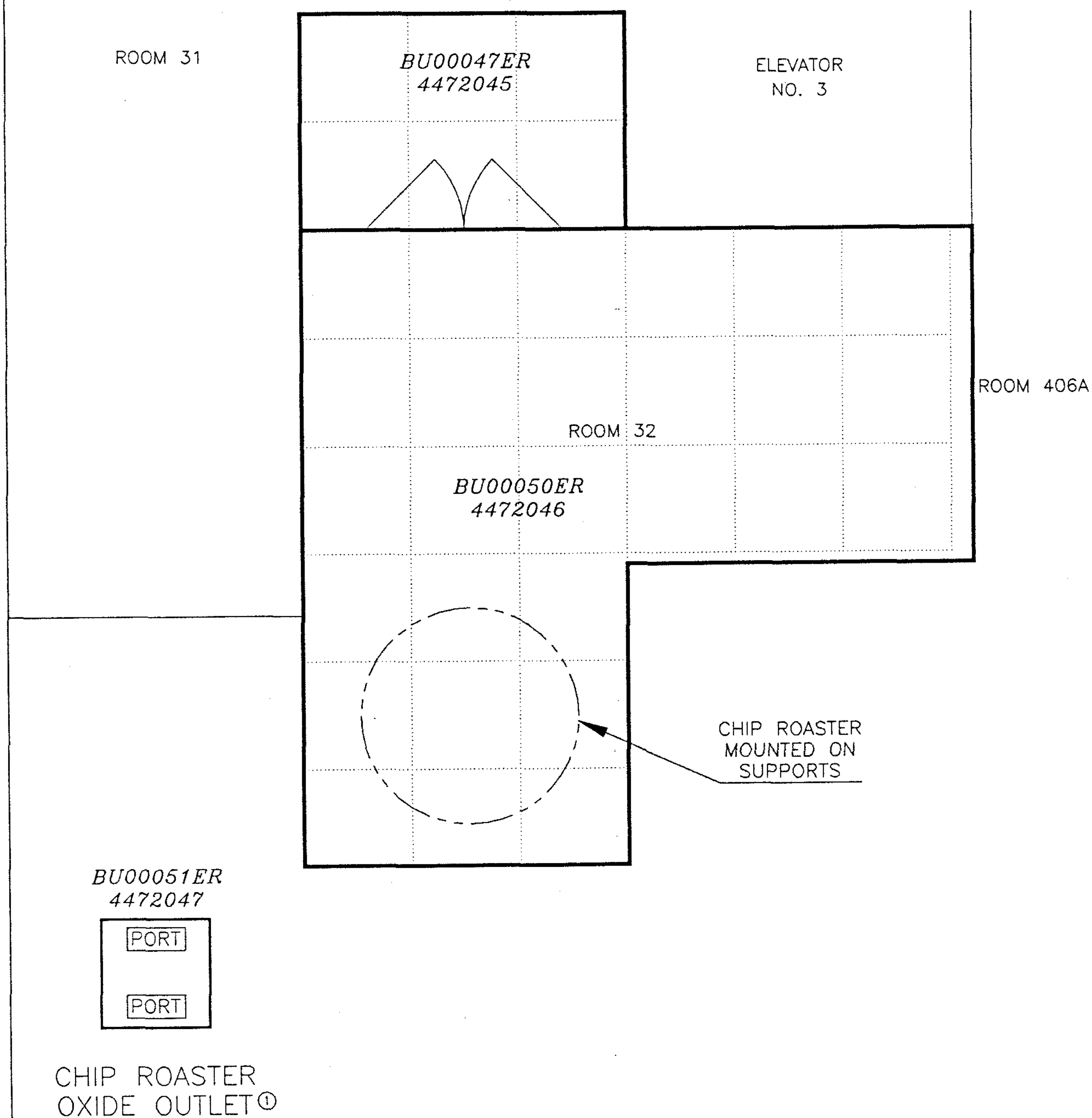
WASH RACK/DRUM WASHING BASIN

KEYWORDS	A	ORIGINAL ISSUE		XX/XX/93	RCH	SRL	DAW	DLS			
1.OU 15	ISSUE	DESCRIPTION		DATE	RFP				DOE	CLASS	JOB NO.
2.PHASE I				U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO							
3.RFI/RI		DESIGNED	HEA	XX/XX/93							
4.TECH MEMO		DRAWN	SCHACKLIN	12/20/93	Rocky Flats Plant						
5.NUMBER 1		CHECKED	WEAVER	XX/XX/93							
BLDG./FACILITY 447		APPROVED	SCHUBBE	XX/XX/93	GOLDEN,COLORADO 80401						
ROOM/AREA 501					OU 15 PHASE I RFI/RI						
GRID COOR./COL NO.					IHSS 204 RAD SAMPLE LOCATIONS						
		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER			ISSUE	FIGURE	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 204			A	2-10	

447 BLDG/FAC.
501 ROOM/AREA
H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
F Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms

NOTES

① A RINSATE SAMPLE WAS COLLECTED FROM THE SURFACE OF THE CHIP ROASTER AROUND THE OXIDE OUTLET PORTS.



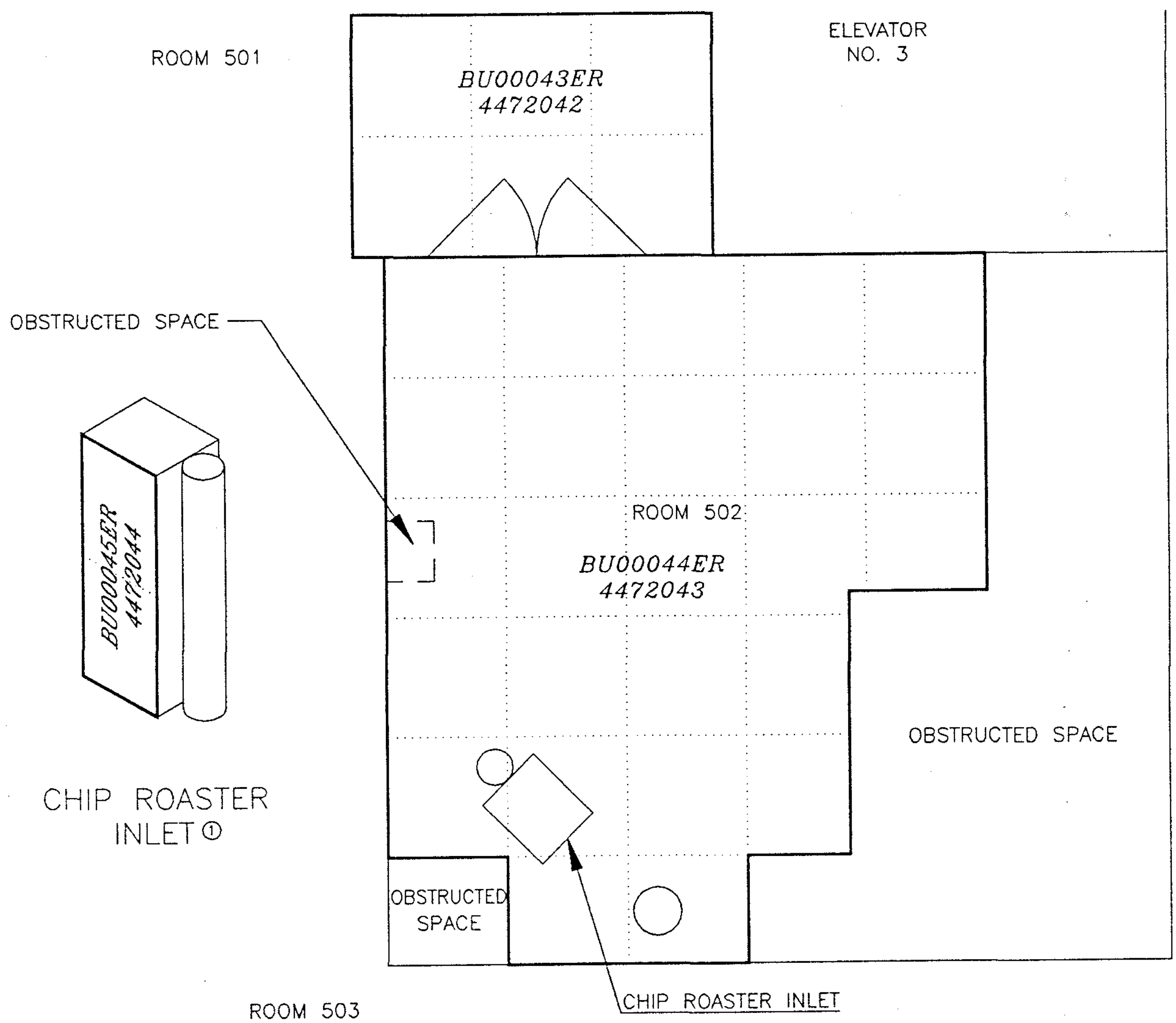
KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	DAW	DLS			
1.OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.

2.PHASE I	DESIGNED	HEA	XX/XX/93	U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO
3.RFI/RI	DRAWN	LENNIE	12/20/93	Rocky Flats Plant
4.TECH MEMO	CHECKED	WEAVER	XX/XX/93	GOLDEN,COLORADO 80401
5.NUMBER 1	APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI
BLDG./FACILITY 447				IHSS 204 RINSATE SAMPLE LOCATIONS
ROOM/AREA 31/32				
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93	SIZE: B · DRAWING NUMBER: IHSS 204 · ISSUE: A · FIGURE: 2-11
MASTER YES ☐ NO ☒ · SCALE: NONE	APPROVED RFP			
	APPROVED DOE			

447 BLDG/FAC.
31/32 ROOM/AREA
H Htg-Vent
A Arch
G Gl. Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms

NOTES

① A RINSATE SAMPLE WAS COLLECTED FROM THE SURFACE OF THE CHIP ROASTER INLET.



KEYWORDS		
1.OU 15		
2.PHASE I		
3.RFI/RI	DESIGNED	HEA XX/XX/93
4.TECH MEMO	DRAWN	LENNIE XX/XX/93
5.NUMBER 1	CHECKED	WEAVER XX/XX/93
BLDG./FACILITY 447	APPROVED	SCHUBBE XX/XX/93
ROOM/AREA 501/502		
GRID COOR./COL NO.	SUBMITTED	BIERBAUM XX/XX/93
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE

ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.
A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	DAW	DLS			

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO

Rocky Flats Plant

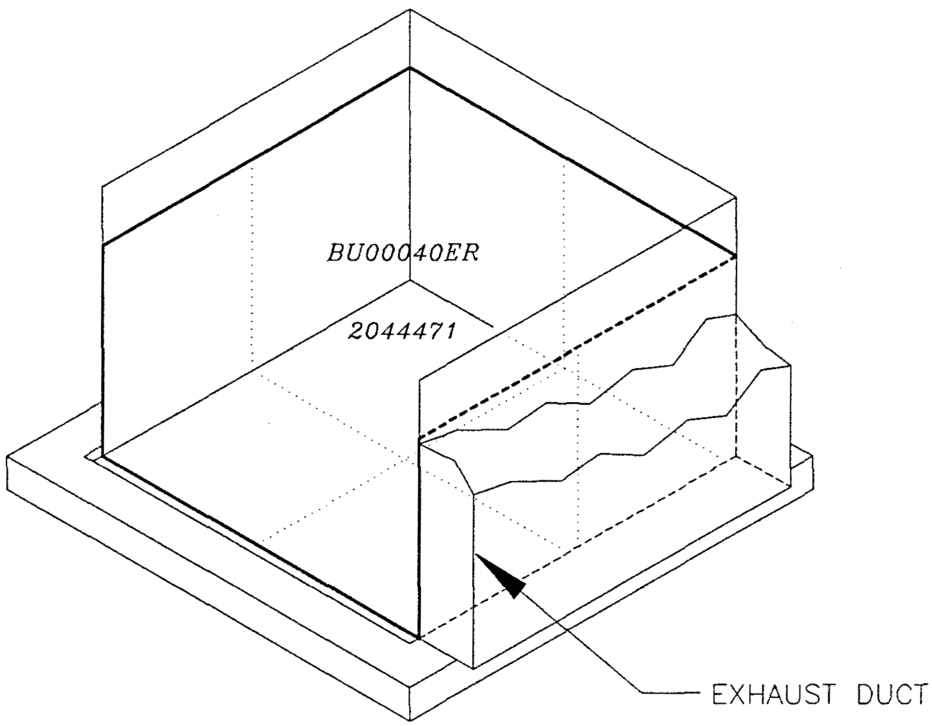
GOLDEN,COLORADO 80401

OU 15 PHASE I RFI/RI

IHSS 204 RINSATE SAMPLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 204	A	2-12

447 BLDG/FAC
502 ROOM/AREA

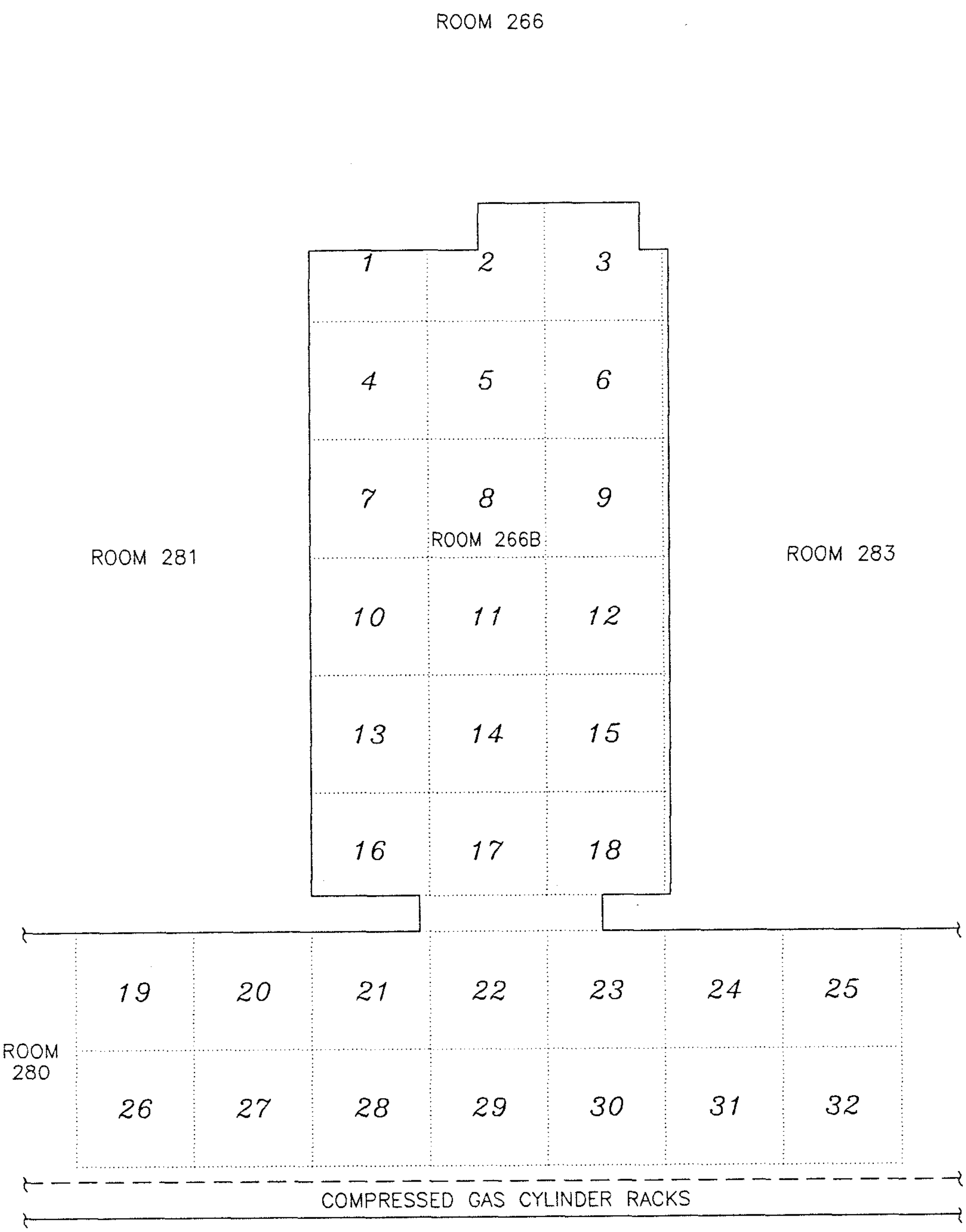


WASH RACK/DRUM WASHING BASIN

KEYWORDS	A	ORIGINAL ISSUE			XX/XX/93	RCH	SRL	DAW	DLS		
1.OU 15	ISSUE	DESCRIPTION			DATE	RFP			DOE	CLASS	JOB NO.
2.PHASE I					U.S. DEPARTMENT OF ENERGY						
3.RFI/RI		DESIGNED	HEA	XX/XX/93	ROCKY FLATS AREA OFFICE GOLDEN,COLORADO						
4.TECH MEMO		DRAWN	SCHACKLIN	12/20/93	**Rocky Flats Plant**						
5.NUMBER 1		CHECKED	WEAVER	XX/XX/93							
BLDG./FACILITY 447		APPROVED	SCHUBBE	XX/XX/93	GOLDEN,COLORADO 80401						
ROOM/AREA 501					OU 15 PHASE I RFI/RI						
GRID COOR./COL NO.					IHSS 204 RINSATE SAMPLE LOCATIONS						
		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER			ISSUE	FIGURE	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B	IHSS 204			A	2-13	

447
BLDG/FAC.
501
ROOM/AREA

H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
F Fire Prot.
L Layout
F Flow Diag.
S Stds
X Alarms



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	PRB	DLS			
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.

2. PHASE 1	DESIGNED	HEA	XX/XX/93
3. RFI/RI	DRAWN	LENNIE	12/20/93
4. TECH MEMO	CHECKED	BIERBAUM	XX/XX/93
5. NUMBER 1	APPROVED	SCHUBBE	XX/XX/93
BLDG./FACILITY 881			
ROOM/AREA 266B			
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP	
		APPROVED DOE	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO

Rocky Flats Plant

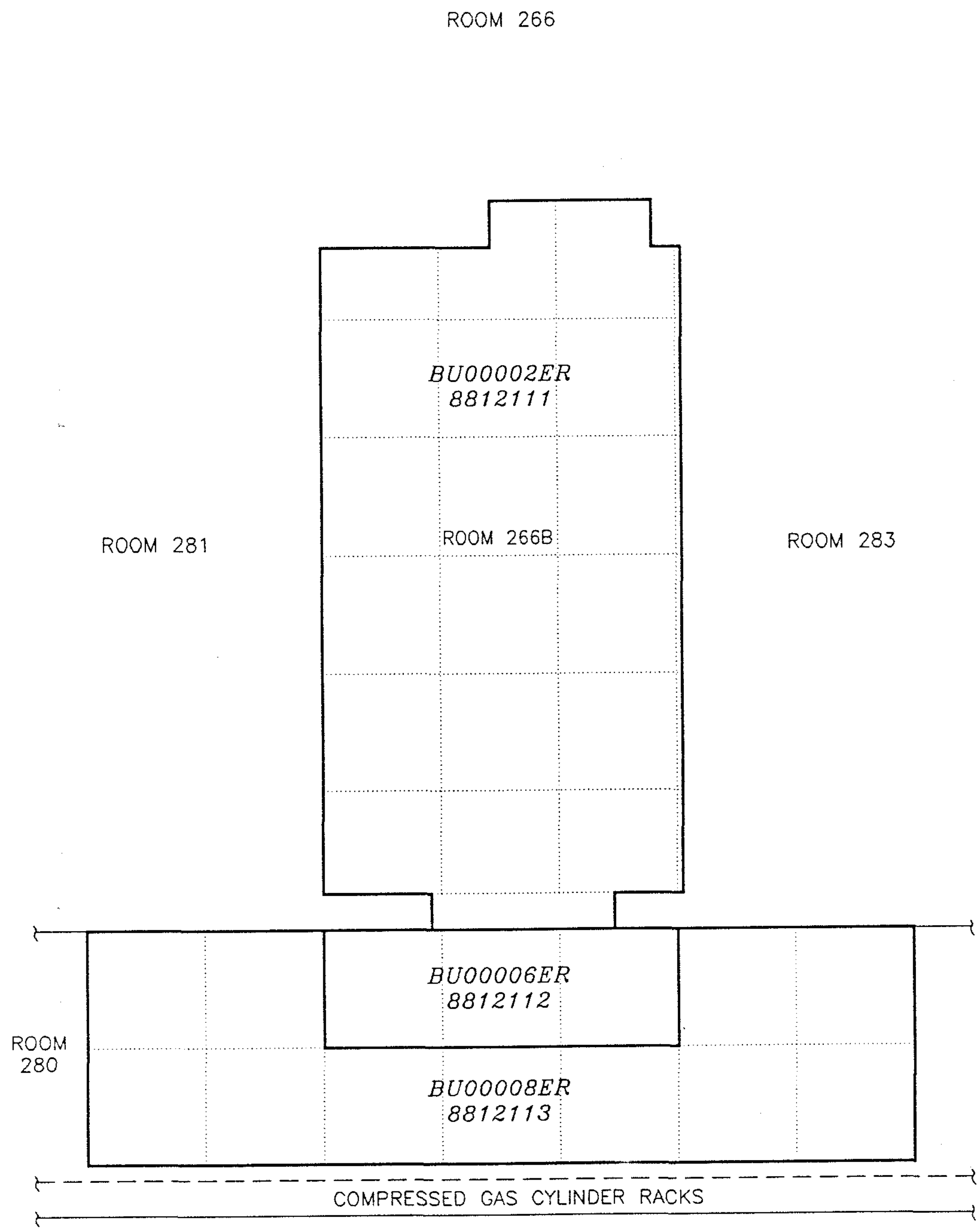
GOLDEN,COLORADO 80401

OU 15 PHASE I RFI/RI

IHSS 211 RAD SAMPLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 211	A	2-14

881
BLDG/FAC.
266B
ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Slds
X Alarms



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	PRB	DLS			
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.
2. PHASE I										
3. RFI/RI										
4. TECH MEMO										
5. NUMBER 1										
BLDG./FACILITY 881										
ROOM/AREA 266B										
GRID COOR./COL NO.										

DESIGNED	HEA	XX/XX/93
DRAWN	LENNIE	12/20/93
CHECKED	BIERBAUM	XX/XX/93
APPROVED	SCHUBBE	XX/XX/93
SUBMITTED	BIERBAUM	XX/XX/93
APPROVED RFP		
APPROVED DOE		

MASTER YES ☐ NO ☒

SCALE: NONE

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO

Rocky Flats Plant

GOLDEN,COLORADO 80401

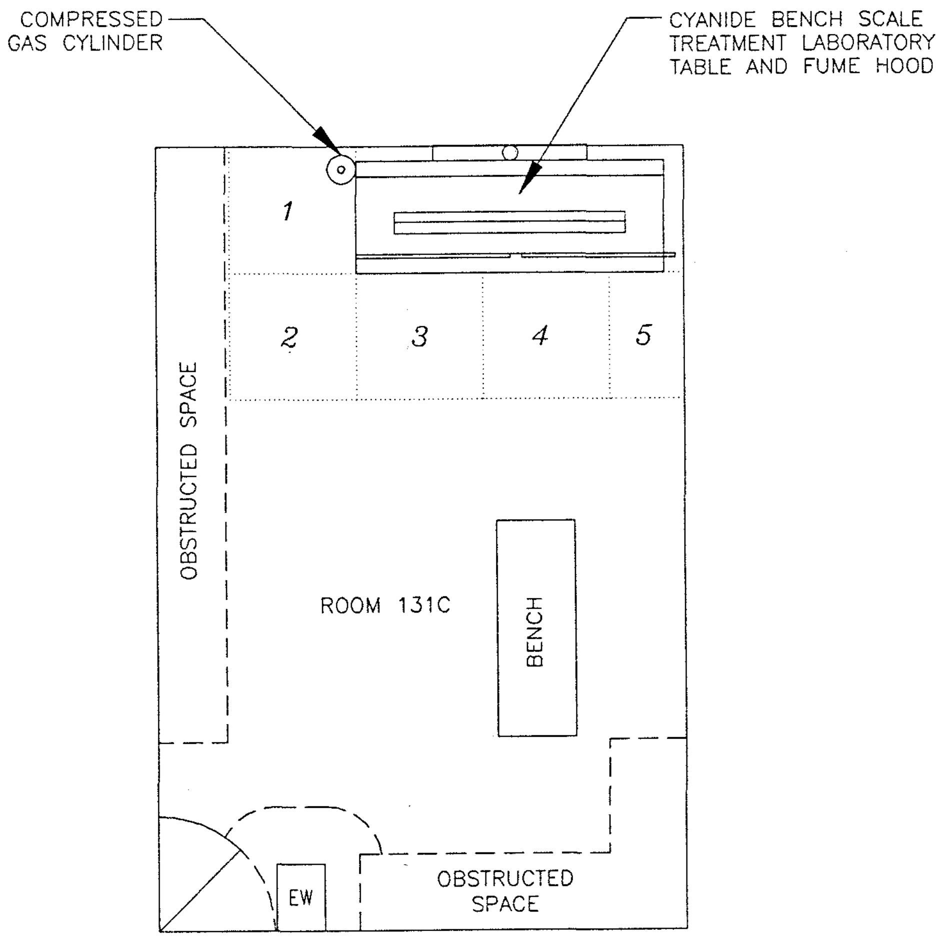
OU 15 PHASE I RFI/RI

IHSS 211 RINSATE SAMPLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 211	A	2-15

881
BLDG/FAC.
266B
ROOM AREA

H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	PRB	DLS			
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.

2. PHASE 1	DESIGNED	HEA	XX/XX/93
3. RFI/RI	DRAWN	LENNIE	12/20/93
4. TECH MEMO	CHECKED	BIERBAUM	XX/XX/93
5. NUMBER 1	APPROVED	SCHUBBE	XX/XX/93
BLDG./FACILITY 881			
ROOM/AREA 131C			
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP	
		APPROVED DOE	

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

Rocky Flats Plant

GOLDEN, COLORADO 80401

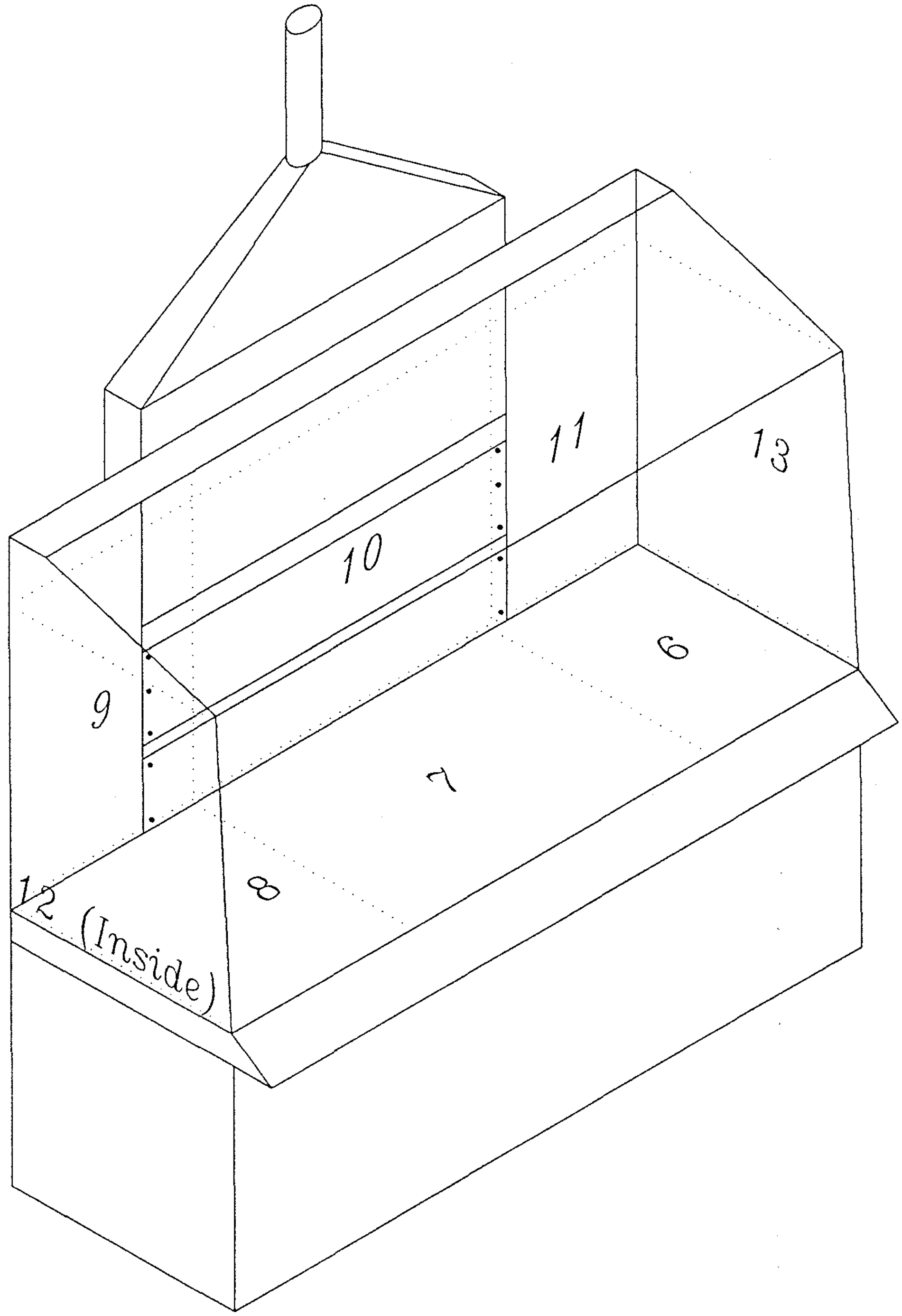
OU 15 PHASE I RFI/RI

IHSS 217 RAD
SAMPLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 217	A	2-16

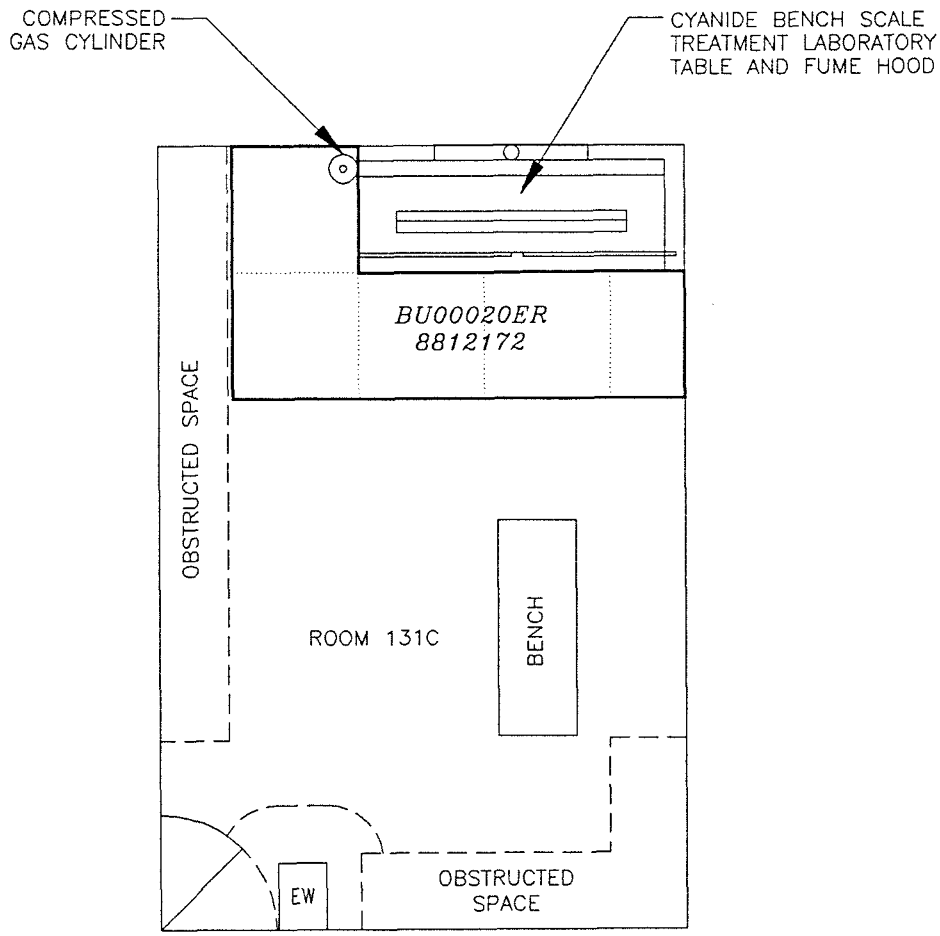
881
BLDG/FAC.
131C
ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst.
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms

CYANIDE BENCH SCALE TREATMENT LABORATORY TABLE AND FUME HOOD



KEYWORDS	A	ORIGINAL ISSUE		XX/XX/93	RCH SRL PRB DLS		
1.OU 15	ISSUE	DESCRIPTION		DATE	RFP	DOE CLASS	JOB NO.
2.PHASE I				U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO			
3.RFI/RI		DESIGNED	HEA	XX/XX/93	Rocky Flats Plant GOLDEN,COLORADO 80401		
4.TECH MEMO		DRAWN	LENNIE	12/20/93			
5.NUMBER 1		CHECKED	BIERBAUM	XX/XX/93			
BLDG./FACILITY 881		APPROVED	SCHUBBE	XX/XX/93	OU 15 PHASE I RFI/RI IHSS 217 RAD SAMPLE LOCATIONS		
ROOM/AREA 131C							
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE: B	DRAWING NUMBER: IHSS 217	ISSUE: A / FIGURE: 2-17
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP					
		APPROVED DOE					

881 BLDG/FAC.
131C ROOM/AREA
H Htg-Vent
A Arch
G GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms

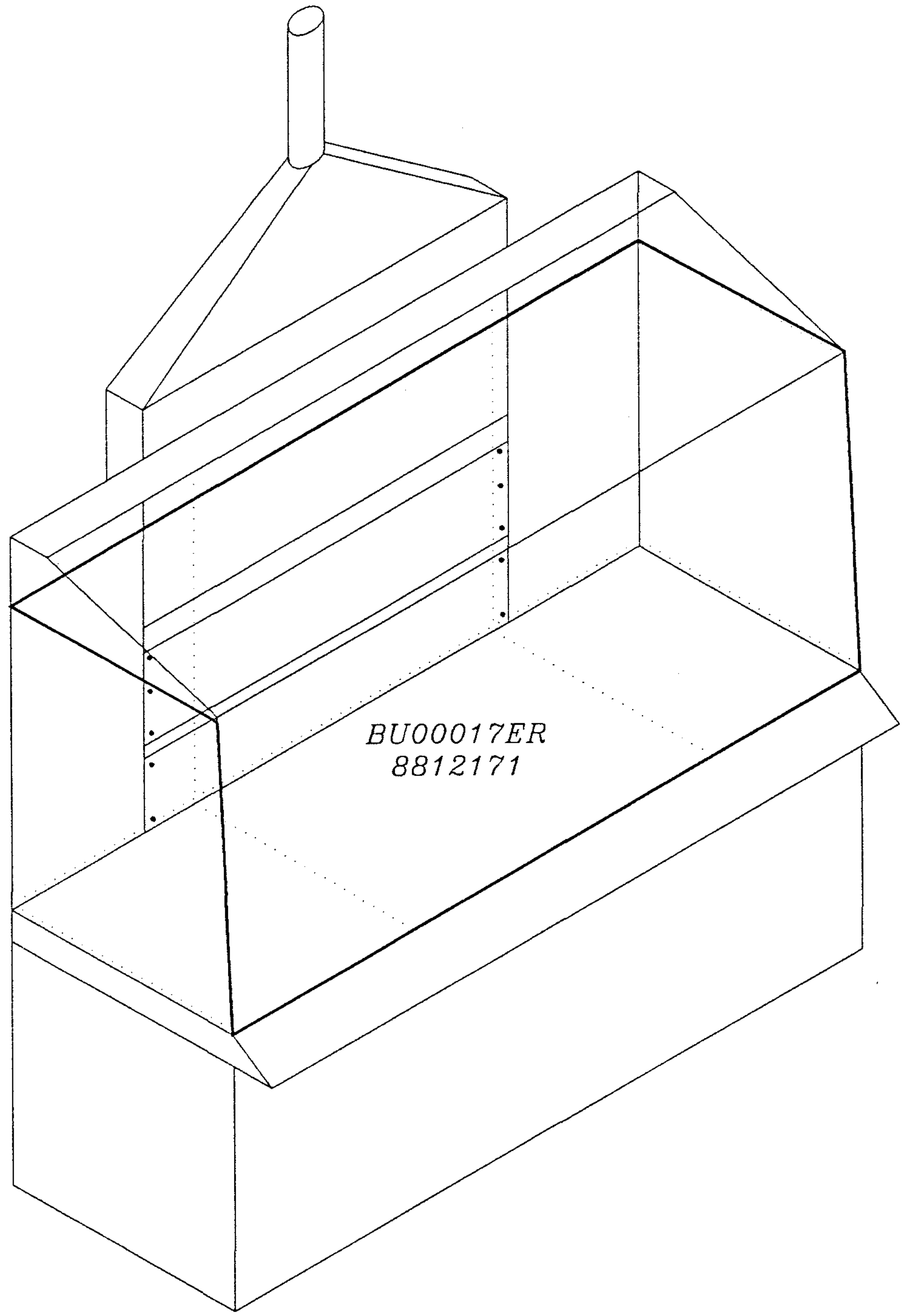


KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH SRL PRB DLS		
1. OU 15	ISSUE	DESCRIPTION	DATE	RFP	DOE	CLASS / JOB NO.
2. PHASE I				U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN, COLORADO		
3. RFI/RI		DESIGNED	HEA	XX/XX/93		
4. TECH MEMO		DRAWN	LENNIE	12/20/93	Rocky Flats Plant	
5. NUMBER 1		CHECKED	BIERBAUM	XX/XX/93		
BLDG./FACILITY 881		APPROVED	SCHUBBE	XX/XX/93	GOLDEN, COLORADO 80401	
ROOM/AREA 131C					OU 15 PHASE I RFI/RI IHSS 217 RINSATE SAMPLE LOCATIONS	
GRID COOR./COL NO.		SUBMITTED	BIERBAUM	XX/XX/93	SIZE / DRAWING NUMBER / ISSUE / FIGURE	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP / APPROVED DOE			B / IHSS 217 / A / 2-18	

881
BLDG/FAC
131C
ROOM/AREA

H Htg-Vent
A Arch
C GL Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layouts
F Flow Diag.
S Stds
X Alarms

CYANIDE BENCH SCALE TREATMENT LABORATORY TABLE AND FUME HOOD



KEYWORDS	A	ORIGINAL ISSUE	XX/XX/93	RCH	SRL	PRB	DLS			
1.OU 15	ISSUE	DESCRIPTION	DATE	RFP				DOE	CLASS	JOB NO.

2.PHASE 1	DESIGNED	HEA	XX/XX/93
3.RFI/RI	DRAWN	LENNIE	12/20/93
4.TECH MEMO	CHECKED	BIERBAUM	XX/XX/93
5.NUMBER 1	APPROVED	SCHUBBE	XX/XX/93
BLDG./FACILITY 881			
ROOM/AREA 131C			
GRID COOR./COL NO.	SUBMITTED	BIERBAUM	XX/XX/93
MASTER YES ☐ NO ☒ / SCALE: NONE	APPROVED RFP		
	APPROVED DOE		

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN,COLORADO

Rocky Flats Plant

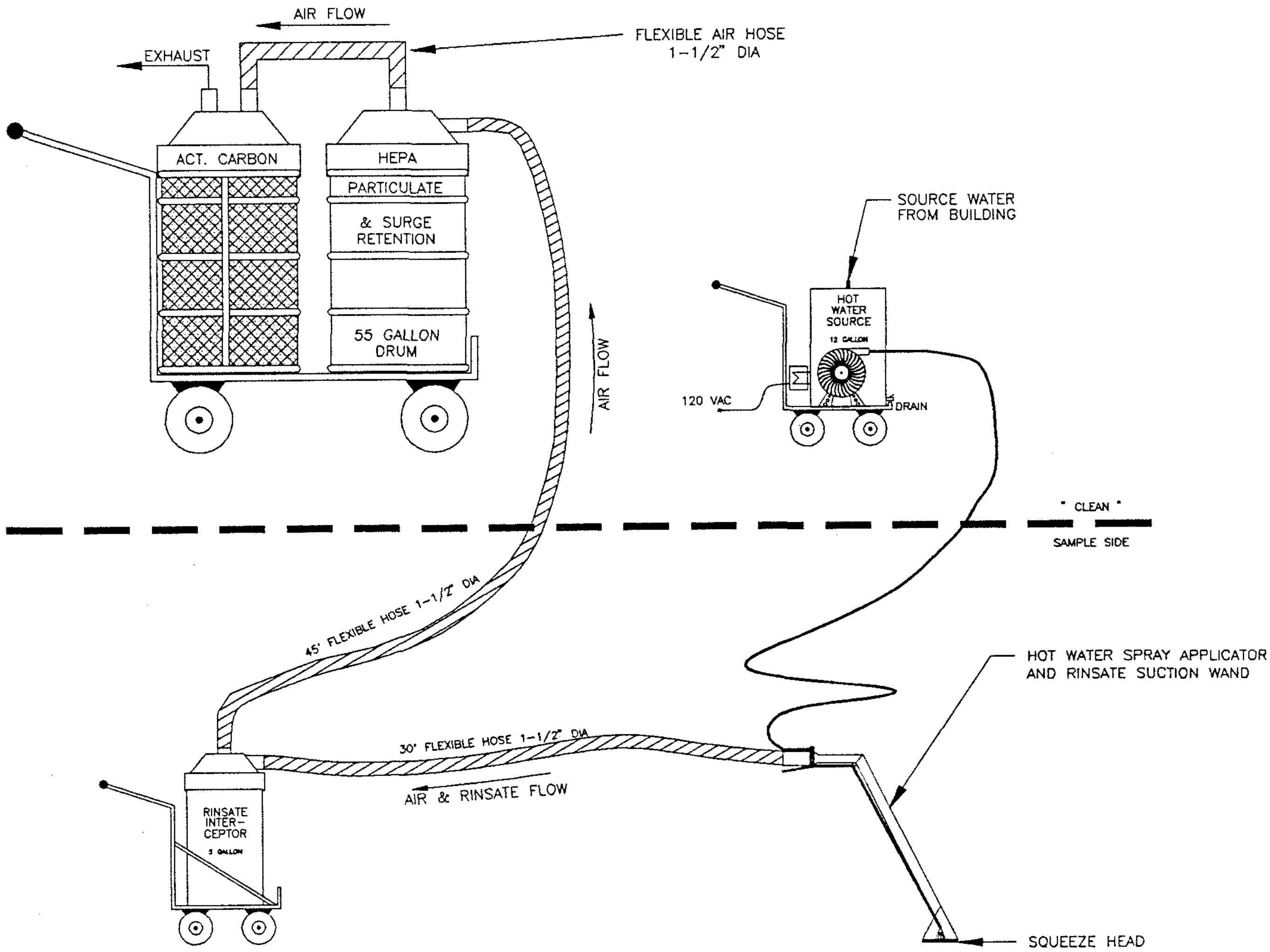
GOLDEN,COLORADO 80401

OU 15 PHASE I RFI/RI

IHSS 217 RINSATE SAMPLE LOCATIONS

SIZE	DRAWING NUMBER	ISSUE	FIGURE
B	IHSS 217	A	2-19

881
BLDG/FAC.
131C
ROOM/AREA
H Htg-Vent
A Arch
G Gl. Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layout
F Flow Diag.
S Stds
X Alarms



KEYWORDS	A	ORIGINAL ISSUE			XX/XX/93	DSH	SRL	RCH	DLS	
1.OU 15	ISSUE	DESCRIPTION			DATE	RFP		DOE	CLASS	JOB NO.
2.PHASE I					U.S. DEPARTMENT OF ENERGY ROCKY FLATS AREA OFFICE GOLDEN,COLORADO					
3.RFI/RI		DESIGNED	HINDS	04/01/93						
4.TECH MEMO		DRAWN	LENNIE	12/21/93	Rocky Flats Plant					
5.NUMBER 1		CHECKED	HEA	XX/XX/93						
BLDG./FACILITY		APPROVED	SCHUBBE	XX/XX/93	GOLDEN,COLORADO 80401					
ROOM/AREA					OU 15 PHASE I RFI/RI					
GRID COOR./COL NO.					HOT WATER RINSATE SAMPLING SYSTEM					
		SUBMITTED	BIERBAUM	XX/XX/93	SIZE	DRAWING NUMBER		ISSUE	FIGURE	
MASTER YES ☐ NO ☒	SCALE: NONE	APPROVED RFP			B			A	2-20	
		APPROVED DOE								

BLDG./FAC.
ROOM/AREA
H Htg-Vent
A Arch
G Gl. Box
E Elec
D Detection
M Mech
I Inst
B Building
T Title
C Civil
U Utilities
P Piping
W Fire Prot.
L Layout
F Flow Diag.
S Stds
X Alarms

Section 3.0

3.0 PRESENTATION OF RESULTS

This section presents the results of the Stage I and II field investigations for the six IHSSs which comprise OU 15. A discussion of historical use, the results of the visual inspection, and the presentation of the radiological sampling/survey and hot water rinsate laboratory analytical results is provided for each IHSS in the following sections. A more detailed description documenting the historical use of each IHSS is included in Section 2.0 of the Work Plan and forms the basis for the historical use discussions in this section.

Only those individual constituents that were detected by the laboratory analysis of the hot water rinsate samples are reported in the sections below. The hot water rinsate sample results presented in this section are a combination of validated and unvalidated data, since the validation process has not yet been completed for all the OU 15 samples. A full set of validated hot water rinsate analytical data will be provided in the Phase I RFI/RI Report. Results from the direct alpha and beta radiation surveys are not included in this section, since they were not used in the radiological analysis of the OU 15 IHSSs. The rationale for this decision is provided in Section 4.0. The direct alpha and beta radiation survey results will be provided in the Phase I RFI/RI Report.

The data tables included in each of the following subsections present the hot water rinsate chemical and radionuclide results, the initial and final smear sample results, the dose-rate survey results, and the beryllium smear sample results, where appropriate. The hot water rinsate and smear sample results were used to estimate chemical concentrations or radionuclide activities in dust on the surfaces from which the samples were collected. This information is included in the applicable tables.

The hot water rinsate sample results are given in units of micrograms per liter (ug/l) or picoCuries per liter (pCi/l). These data were converted to surface concentrations or activities, micrograms per square meter (ug/m^2) or picoCuries per square meter (pCi/m^2), using the rinsate volume and area data for each sample. Surface concentrations were converted to concentrations in dust, milligrams per kilogram (mg/kg) or picoCuries per gram (pCi/g), assuming 560 mg of dust per square meter of surface area (Hawley, 1985). The rinsate volume and area data, as well as the raw data and estimated dust concentrations, are given for each sample in the appropriate tables in the following subsections.

3.1 IHSS 178 - Building 881, Drum Storage Area (Room 165)

The following subsections address the historical use and visual inspection of IHSS 178, and present the radiological sampling/survey and hot water rinsate laboratory analytical results for the samples collected in IHSS 178.

3.1.1 Historical Use of IHSS 178

IHSS 178 is a drum storage area located within Room 165 on the first floor of Building 881. There is no basement beneath Room 165. The drum storage area was first used in 1953 when Building 881 operations began. Currently IHSS 178 is used as a RCRA 90-day accumulation area.

The storage area within Room 165 consists of two painted circles, which are each approximately four feet in diameter. The maximum number of 55-gallon drums that can be stored in the IHSS at one time is five. Drums are stored directly on the floor. There are no containment berms around the storage area or at the two doors.

The drums stored at this IHSS contained wastes generated within Building 881. Analytical results for wastes from Building 881, typical of those stored in IHSS 178, are presented in the Work Plan. These drums contained VOCs (Freon TF, 1,1,1-trichloroethane, and carbon dioxide) and possibly low-level radioactive wastes.

Routine visual monitoring for spills and/or releases was conducted during the period of operation of this storage unit. However, the frequency at which visual monitoring was performed is not presently known. As part of the development of the closure plan for this unit, a site visit was performed during November 1986. At that time, there was no visual evidence or documentation of any spills or releases in the storage unit. Five 55-gallon drums were stored at this IHSS in November 1986.

3.1.2 *Visual Inspection of IHSS 178*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 178. At the time of the visit, no drums were stored in the IHSS. The IHSS is located in Room 165 of Building 881, on the floor adjacent to the access door for the building plenum in Room 164. The IHSS is comprised of two painted circles that straddle a building column. At the time of the inspection, there were no access restrictions to the IHSS itself.

There were no secondary containment berms present around the IHSS. No discernable slope was noted for the floor. With the exception of the IHSS circles, the majority of the concrete floor in Room 165 was not painted. The unpainted concrete did have a finishing coat and was in good condition.

3.1.3 Data Presentation for IHSS 178

The results of the Stage I and II field investigations for IHSS 178 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.1-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.1-2. The results of the radiological smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are presented in Table 3.1-3. Finally, the results of the beta and gamma dose-rate surveys are summarized in Table 3.1-4.

3.2 IHSS 179 - Building 865, Drum Storage Area (Room 145)

The following subsections address the historical use and visual inspection of IHSS 179, and present the radiological sampling/survey and hot water rinsate laboratory analytical results for the samples collected in IHSS 179.

3.2.1 Historical Use of IHSS 179

IHSS 179 is a drum storage area located in the north end of Room 145, which is situated on the ground floor in the center of Building 865. Drum storage in IHSS 179 began in 1970. By November 1986, IHSS 179 was being used as a RCRA 90-day accumulation area. The IHSS currently is not used for waste storage.

The dimensions of the IHSS are approximately 8 feet by 12 feet. The maximum inventory stored in the IHSS at one time was ten 55-gallon drums. The drums stored in IHSS 179 were placed directly on the concrete floor. No containment berms were present immediately adjacent to the IHSS.

Samples were obtained from drums stored in IHSS 179 during May and July 1986, and analyzed for total alpha, beryllium, and select organic compounds. The results of the analyses are presented in the Work Plan. As detailed in these analytical results, total alpha, beryllium and certain organic compounds were detected in either one or both of the drums sampled.

During a site visit in November 1986, two drums were being stored in the IHSS. The drums contained oils, chlorinated solvents, radioactive waste, and possibly beryllium. Shortly thereafter, the use of chlorinated solvents was eliminated in the area where the wastes stored in IHSS 179 were being generated. Consequently, after 1986, it is likely that the waste drums stored in IHSS 179 contained only oil which was possibly contaminated with beryllium and radioactive waste.

Visual monitoring of the drums stored in IHSS 179 for spills and releases was performed daily. There have been no documented releases and based on prior visual inspections, there was no evidence of spills. If any spills from the drums did occur, the spilled material may have collected in the concrete pit underneath the Electron Beam (EB) welder, located north of the IHSS. The pit has a sump with an automatic pump operated by a float switch. Accumulated liquids would have been transferred via overhead piping and the valve vault system to Building 374 for treatment.

3.2.2 *Visual Inspection of IHSS 179*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 179. At the time of the visit, no drums were stored in the IHSS. The IHSS is located on the floor of Room 145 in Building 865, in front of a large electrical panel, and is painted to mark its location. Markings are also present to identify the access requirements for the electrical panel. At the time of the inspection there were no access restrictions to the IHSS itself, other than those associated with the Radiologically Controlled Area (RCA) in which it is located.

There were no secondary containment berms present around the IHSS. It was noted that the floor slopes north towards a concrete pit in the floor under the EB welder. The concrete floor in the IHSS and surrounding area was painted and was in good condition.

3.2.3 Data Presentation for IHSS 179

The results of the Stage I and II field investigations for IHSS 179 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.2-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.2-2. The results of the radiological smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are presented in Table 3.2-3. The results of the beta and gamma dose-rate surveys are summarized in Table 3.2-4. Finally, the results of the beryllium smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are provided in Table 3.2-5.

3.3 IHSS 180 - Building 883, Drum Storage Area (Room 104)

The following subsections address the historical use and visual inspection of IHSS 180, and present the radiological sampling/survey and hot water rinsate laboratory analytical results for the samples collected in IHSS 180.

3.3.1 *Historical Use of IHSS 180*

IHSS 180 is a drum storage area located within Room 104 of Building 883. Room 104 was added on to the east side of the original building and was built on grade. The area was first used as a container storage area in 1981. During a portion of this time, the area was used as a 90-day accumulation area for RCRA-regulated wastes. The area is currently used for storage of low-level radioactive waste (nonhazardous).

The storage area within Room 104 measures 10 feet by 16 feet. The unit stored a maximum of thirty 55-gallon drums, which were placed directly on the floor. There are no containment berms around the drums and no drains in the floor.

Samples from drums stored in the area were obtained on five separate dates and analyzed for total alpha, beryllium, and "general components." The results of the analyses are presented in the Work Plan. As indicated by the analytical results, VOCs, beryllium, and radioactivity were present in the drums that were sampled. The wastes included oils contaminated with organic compounds and uranium. Visual monitoring of the storage area was conducted periodically. The frequency at which visual monitoring was conducted is not presently known. However, no documentation was found that indicates that a release occurred from drums stored at this IHSS.

3.3.2 *Visual Inspection of IHSS 180*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 180. At the time of the visit, no drums were stored in the IHSS. The IHSS is located on the floor of Room 104 in Building 883, and is painted to mark its location. At the time of the inspection there were no access restrictions to the IHSS itself, other than those associated with the RCA in which it is located.

There were no secondary containment berms present around the IHSS or at the dock door leading from Room 104 to the outside of the building. It was noted that the floor slopes from the IHSS towards the weigh scale, which is housed in a concrete pit recessed in the floor, and not towards the dock door. The concrete floor in the IHSS and surrounding area was painted, but was in scuffed and in poor condition.

3.3.3 *Data Presentation for IHSS 180*

The results of the Stage I and II field investigations for IHSS 180 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.3-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.3-2. The results of the radiological smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are presented in Table 3.3-3. The results of the beta and gamma dose-rate surveys are summarized in Table 3.3-4. Finally, the results of the beryllium smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are provided in Table 3.3-5.

3.4 *IHSS 204 - Unit 45, Original Uranium Chip Roaster (Building 447, Rooms 32 and 502)*

The following subsections address the historical use and visual inspection of IHSS 204, and present the radiological sampling and hot water rinsate laboratory analytical results for the samples collected in IHSS 204.

3.4.1 *Historical Use of IHSS 204*

The Original Uranium Chip Roaster is located in Rooms 32 and 502 of Building 447, and is constructed of mild steel casing lined with alumina refractory brick. It is cylindrical with a diameter of 5 feet 6 inches and a height of 7 feet 4 inches. The unit was identified as Unit 45 in the 1986 RCRA Part B permit application.

The unit oxidizes elemental uranium to uranium oxide. Depleted uranium chips originated from the Building 444 production area and were historically coated with small amounts of oils and coolants (Freon TF and 1,1,1-trichloroethane). Chips were stored in 55-gallon drums and transferred to Building 447 for roasting. Currently, the Original Uranium Chip Roaster is in operation; however, the uranium chips are no longer coated with oils/coolants that are RCRA-regulated hazardous wastes.

Before roasting, the chips were rinsed with hot water to remove excess coatings. The rinsate was disposed of in the building process drain. The chips were fed into the top of the roaster at a rate of approximately three 55-gallon drums per day. The chips ignited upon entry and sustained self-combustion throughout the roasting cycle. When the roasting cycle was complete, the uranium oxide was removed through a hole in the bottom of the unit and was collected in 30-gallon drums.

An incident involving the roaster occurred in Room 32 of Building 447 on June 28, 1985. The ignition of some cardboard in the room set off the sprinklers and fire alarm, and flooded the basement of the building. A second incident, indirectly related to this IHSS occurred on July 20, 1986. During a major rain event, a main 36-inch storm sewer/drainage system collapsed and flooded portions of Buildings 444 and 447. In Building 447, several inches of water accumulated throughout the process areas. The basement, including Room 32, was flooded with several feet of water.

3.4.2 *Visual Inspection of IHSS 204*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 204. At the time of the visit, approximately twelve drums were stored in Room 32 and six drums were stored in Room 502. Miscellaneous equipment, including ladders and drum dollies, were also present in both rooms. No drums or equipment were present in the Wash Rack/Drum Washing Basin, which is located in Room 501. The Original Uranium Chip Roaster spans two floors. The chip inlet is located upstairs in Room 502, and the main body of the roaster, including the oxide outlet ports, is located in Room 32, directly beneath Room 502. At the time of the inspection there were no access restrictions in Rooms 31 and 501, other than those associated with the RCA in which they are located. However, entry into Room 32 required use of Anti-C clothing, and entry into Room 502 required use of a full-face respirator.

There were no secondary containment berms present around Rooms 32 or 502. No discernable slope was noted for the floors in either room. The concrete floor in both rooms was painted and generally in good condition, although black dust was visible on the floors and exterior surfaces of the chip roaster in both rooms. The concrete pad and berm of the Wash Rack/Drum Washing Basin was in good condition, with no apparent gaps or cracks. The floor in the basin slopes to a process drain located in the center of the pad.

3.4.3 *Data Presentation for IHSS 204*

The results of the Stage I and II field investigations for IHSS 204 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.4-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.4-2. Finally, the results of the radiological smear samples collected initially (pre-rinsate samples) are presented in Table 3.4-3.

3.5 IHSS 211 - Unit 26, Building 881, Drum Storage Area (Room 266B)

The following subsections address the historical use and visual inspection of IHSS 211, and present the radiological sampling/survey and hot water rinsate laboratory analytical results for the samples collected in IHSS 211.

3.5.1 Historical Use of IHSS 211

IHSS 211 is a drum storage area located in Room 266B on the second floor annex of Building 881. Since May 16, 1989, IHSS 211 has been operating as a RCRA 90-day accumulation area. Prior to this time, the unit was a drum storage area for mixed waste and was included in the hazardous and low-level mixed waste RCRA Part B permit application as Unit 26. The unit was first used as a drum storage area in 1981.

The drum storage area is 10 feet by 20 feet and can store a maximum of twenty-nine 55-gallon drums at one time. The floor is constructed of concrete, which is sealed with epoxy paint. There are no containment berms around the storage area. Drums are stored directly on the floor or in catch pans. Weekly container inspections are conducted to visually assess the structural integrity of the drums, and to check for leaks and spills.

The wastes stored in the unit have historically included both liquids and solids generated from the general laboratories in the building. The waste streams currently approved for storage in Unit 26 include low-level combustible waste potentially contaminated with hazardous solvents and/or metals, and metal and glass waste or materials contaminated with hazardous solvents. There is no recorded documentation of a spill or release in the unit.

3.5.2 *Visual Inspection of IHSS 211*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 211. At the time of the visit, there were seven 55-gallon drums located in the IHSS. Six of the drums contained solid waste, and one of the drums contained liquid waste and was in a catch pan. Access to the IHSS is restricted by a locked cage door.

There were no secondary containment berms at the entrance to the IHSS or under the sealed door at the back of the IHSS. The concrete floor was painted with an epoxy coating and was in good condition. A sealed crack, which was approximately one to two inches wide and ran the length of the room, was noted on the floor. RFP personnel were unfamiliar with when the crack had first appeared and how often it had been repaired, but indicated that the crack had most recently been repaired approximately one month prior to the site visit. RFP personnel added that the crack may have originally been narrower, and may have been ground out at the surface to facilitate its repair.

It was noted that ground water may leak into Building 881 in the vicinity of Room 266B, since the building is partially below grade in this area. Room 266B has two catch pans positioned approximately 6 inches under the ceiling to collect potential seepage into the room. The catch pans drain to collection bottles on the floor. Additional catch pans and collection bottles were located in the hallway outside of the IHSS.

3.5.3 *Data Presentation for IHSS 211*

The results of the Stage I and II field investigations for IHSS 211 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.5-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.5-2. The results of the radiological smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are presented in Table 3.5-3. Finally, the results of the beta and gamma dose-rate surveys are summarized in Table 3.5-4.

3.6 *IHSS 217 - Unit 32, Cyanide Bench Scale Treatment (Building 881, Room 131C)*

The following subsections address the historical use and visual inspection of IHSS 217, and present the radiological sampling/survey and hot water rinsate laboratory analytical results for the samples collected in IHSS 217.

3.6.1 *Historical Use of IHSS 217*

IHSS 217 is a currently non-operational cyanide bench scale treatment process (RCRA Unit 32) located in Room 131C, on the first floor of Building 881. The unit consists of a 4 feet by 5 feet painted metal fume hood and laboratory table, three 4-liter polyethylene bottles, a glass beaker, and a chlorine-specific ion electrode. The laboratory table and metal fume hood were originally installed in 1952. No information is available regarding the operational history of this unit prior to its use for treatment of cyanide. The hood appears to be made of metal, covered with a coat of paint. The hood has an integral lip across the front, which provides containment of any wastes spilled within the hood.

The bench scale treatment process converted cyanide to cyanate. Aqueous cyanide solutions were transferred to Unit 32 for analysis of cyanide content using a cyanide still. Very low concentrations of other listed hazardous wastes may have been in these solutions. Wastes generated from this analysis were collected in the three 4-liter polyethylene bottles stored in the steel fume hood of the unit. The bottom of the fume hood acted as a secondary containment system in the event of a spill. There was no automated monitoring system for detecting releases. No more than five liters of the cyanide waste were stored in the unit at any given time. The cyanide solution was treated in a 4-liter bottle with sodium or calcium hypochlorite to oxidize the cyanide to cyanate. A residual chlorine-specific ion electrode was used to determine when the conversion was complete. There have been no documented releases from the polyethylene bottles or spills during transfer or neutralization.

The neutralized solution was poured down a process waste drain located in Room 131C and transferred via the process waste line system to Building 374 for further treatment. Since the drain is also used for disposal of other wastes generated in the laboratory, the drain and the associated piping will be investigated separately from IHSS 217, as part of a under building contamination investigation.

3.6.2 *Visual Inspection of IHSS 217*

As part of the OU 15 Phase I RFI/RI, a site visit was conducted on April 23, 1993 for the purpose of visually observing the condition of IHSS 217. At the time of the visit, two permanently attached crucibles and a removable tray were present on top of the laboratory table surface. Some staining was evident on both the laboratory table and fume hood surfaces. At the time of the inspection there was an Operational Safety Approval requirement for access into the fume hood.

Secondary containment for the laboratory table is provided by the fume hood itself and a lip on the front side of the table. The floor covering in Room 131C was comprised of linoleum tiles, which appeared to be in good condition. Some staining was evident on these tiles. There were no secondary containment berms present around Room 131C.

3.6.3 Data Presentation for IHSS 217

The results of the Stage I and II field investigations for IHSS 217 are presented in this subsection in table form. The analytical data for chemicals detected in the hot water rinsate samples are provided in Table 3.6-1. The analytical data for radionuclides detected in the hot water rinsate samples are included in Table 3.6-2. The results of the radiological smear samples collected initially and during the final radiological surveys (pre- and post-rinsate samples) are presented in Table 3.6-3. Finally, the results of the beta and gamma dose-rate surveys are summarized in Table 3.6-4.

Table 3.1-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 178

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Chemical*	*Result (ug/l)*	*Qualifier*	*Detection Limit (ug/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (mg/kg)*
881	178	IHSS	BU00011ER	16-Aug-93	BNACLP	BENZOIC ACID	65		50	15.09	10	1.75e+2
881	178	IHSS	BU00011ER	16-Aug-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	140		10	15.09	10	3.77e+2
881	178	IHSS	BU00011ER	16-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	38		10	15.09	10	1.02e+2
881	178	IHSS	BU00011ER	16-Aug-93	BNACLP	DI-n-BUTYL PHTHALATE	13		10	15.09	10	3.50e+1
881	178	IHSS	BU00011ER	16-Aug-93	BNACLP	PHENOL	45		10	15.09	10	1.21e+2
881	178	Perimeter	BU00014ER	16-Aug-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	190		10	11.73	6	6.63e+2
881	178	Perimeter	BU00014ER	16-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	86		10	11.73	6	3.00e+2
881	178	Perimeter	BU00014ER	16-Aug-93	BNACLP	DI-n-BUTYL PHTHALATE	41		10	11.73	6	1.43e+2
881	178	Perimeter	BU00014ER	16-Aug-93	BNACLP	DI-n-OCTYL PHTHALATE	11		10	11.73	6	3.84e+1
881	178	Perimeter	BU00014ER	16-Aug-93	BNACLP	PHENOL	30		10	11.73	6	1.05e+2
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	BENZOIC ACID	190		50	13.29	8.8	5.12e+2
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	BENZYL ALCOHOL	18		10	13.29	8.8	4.85e+1
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	210		10	13.29	8.8	5.66e+2
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	200		10	13.29	8.8	5.39e+2
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	DI-n-BUTYL PHTHALATE	24		10	13.29	8.8	6.47e+1
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	DI-n-OCTYL PHTHALATE	28		10	13.29	8.8	7.55e+1
881	178	Pathway	BU00015ER	16-Aug-93	BNACLP	PHENOL	38		10	13.29	8.8	1.02e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.1-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 178

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Radionuclide*	*Result (pCi/l)*	*Error*	*Qualifier*	*Detection Limit (pCi/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (pCi/g)*
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	GROSS ALPHA	7.9	1.2		0.82	15.09	10	2.13e+1
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	GROSS BETA	11	4.0		5.5	15.09	10	2.96e+1
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	PLUTONIUM-239/240	0.023	0.012	B	0.009	15.09	10	6.20e-2
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	RADIUM-226	0.37	0.18	BJ	0.26	15.09	10	9.97e-1
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	URANIUM-233,-234	9.3	1.7	B	0.11	15.09	10	2.51e+1
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	URANIUM-235	0.22	0.20	J	0.036	15.09	10	5.93e-1
881	178	IHSS	BU00011ER	16-Aug-93	DRADS	URANIUM-238	1.0	0.44	B	0.061	15.09	10	2.69e+0
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	GROSS ALPHA	5.2	0.79		0.47	11.73	6	1.82e+1
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	GROSS BETA	10	2.9		3.9	11.73	6	3.49e+1
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	PLUTONIUM-239/240	0.020	0.010	B	0.005	11.73	6	6.98e-2
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	RADIUM-226	0.47	0.20	BJ	0.27	11.73	6	1.64e+0
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	URANIUM-233,-234	5.5	1.2	B	0.035	11.73	6	1.92e+1
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	URANIUM-235	0.21	0.19	J	0.060	11.73	6	7.33e-1
881	178	Perimeter	BU00014ER	16-Aug-93	DRADS	URANIUM-238	0.81	0.38	B	0.035	11.73	6	2.83e+0
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	AMERICIUM-241	0.019	0.010		0.002	13.29	8.8	5.12e-2
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	GROSS ALPHA	28	2.2		0.83	13.29	8.8	7.55e+1
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	GROSS BETA	21	4.4		5.4	13.29	8.8	5.66e+1
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	PLUTONIUM-239/240	0.046	0.016		0.008	13.29	8.8	1.24e-1
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	RADIUM-226	0.45	0.19	BJ	0.27	13.29	8.8	1.21e+0
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	URANIUM-233,-234	26	3.6	B	0.058	13.29	8.8	7.01e+1
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	URANIUM-235	0.98	0.42		0.058	13.29	8.8	2.64e+0
881	178	Pathway	BU00015ER	16-Aug-93	DRADS	URANIUM-238	0.94	0.41	B	0.058	13.29	8.8	2.54e+0

(1) - Calculated assuming 560 mg dust per square meter

Table 3.1-3
Smear Sample Results - IHSS 178

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
881	165	178	1	3	0	2.4e+2	0.0e+0	0	18	0.0e+0	1.4e+3
			2	0	0	0.0e+0	0.0e+0	0	0	0.0e+0	0.0e+0
			3	0	18	0.0e+0	1.4e+3	0	3	0.0e+0	2.4e+2
			4	0	3	0.0e+0	2.4e+2	0	9	0.0e+0	7.2e+2
			5	3	0	2.4e+2	0.0e+0	3	0	2.4e+2	0.0e+0
			6	9	0	7.2e+2	0.0e+0	3	0	2.4e+2	0.0e+0
			7	0	12	0.0e+0	9.7e+2	3	15	2.4e+2	1.2e+3
			8	0	24	0.0e+0	1.9e+3	9	9	7.2e+2	7.2e+2
			9	3	0	2.4e+2	0.0e+0	0	21	0.0e+0	1.7e+3
			10	9	9	7.2e+2	7.2e+2	0	0	0.0e+0	0.0e+0
			11	0	0	0.0e+0	0.0e+0	3	0	2.4e+2	0.0e+0
			12	0	30	0.0e+0	2.4e+3	3	3	2.4e+2	2.4e+2
			13	0	0	0.0e+0	0.0e+0	0	27	0.0e+0	2.2e+3
			14	0	15	0.0e+0	1.2e+3	0	40	0.0e+0	3.2e+3
			15	0	3	0.0e+0	2.4e+2	3	0	2.4e+2	0.0e+0
			16	6	0	4.8e+2	0.0e+0	0	6	0.0e+0	4.8e+2
			17	0	0	0.0e+0	0.0e+0	9	33	7.2e+2	2.7e+3
			18	0	9	0.0e+0	7.2e+2	6	18	4.8e+2	1.4e+3
			19	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			20	3	6	2.4e+2	4.8e+2	6	0	4.8e+2	0.0e+0
			21	0	0	0.0e+0	0.0e+0	0	0	0.0e+0	0.0e+0
			22	0	0	0.0e+0	0.0e+0	0	0	0.0e+0	0.0e+0
			23	3	3	2.4e+2	2.4e+2	0	27	0.0e+0	2.2e+3
			24	0	9	0.0e+0	7.2e+2	0	30	0.0e+0	2.4e+3
			25	0	6	0.0e+0	4.8e+2	0	0	0.0e+0	0.0e+0
			26	6	0	4.8e+2	0.0e+0	0	36	0.0e+0	2.9e+3
			27	3	0	2.4e+2	0.0e+0	6	0	4.8e+2	0.0e+0
			28	3	6	2.4e+2	4.8e+2	0	0	0.0e+0	0.0e+0
			29	0	18	0.0e+0	1.4e+3	0	0	0.0e+0	0.0e+0
			30	0	0	0.0e+0	0.0e+0	0	39	0.0e+0	3.1e+3

(1) - Calculated assuming 560 mg dust per square meter

Table 3.1-4
Beta and Gamma Dose-Rate Survey Data - IHSS 178

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
881	165	178	1	0	0
			2	0	0
			3	0	0
			4	0	0
			5	0	0
			6	0	0
			7	0	0
			8	0	0
			9	0	0
			10	0	0
			11	0	0
			12	0	0
			13	0	0
			14	0	0
			15	0	0
			16	0	0
			17	0	0.4
			18	0	0.4
			19	0	0.4
			20	0	0.4
			21	0	0.4
			22	0	0.4
			23	0	0.4
			24	0	0.4
			25	0	0.4
			26	0	0.4
			27	0	0.4
			28	0	0.4
			29	0	0.4
			30	0	0.4

Table 3.2-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 179

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Chemical*	*Result (ug/l)*	*Qualifier*	*Detection Limit (ug/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (mg/kg)*
865	179	IHSS	BU00036ER	15-Sep-93	BNACLP	1,3-ISOBENZOFURANDIONE	13	J		9.09	3	7.03e+1
865	179	IHSS	BU00036ER	15-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	220		10	9.09	3	1.19e+3
865	179	IHSS	BU00036ER	15-Sep-93	BNACLP	PHENOL	53		10	9.09	3	2.87e+2
865	179	Perimeter	BU00033ER	15-Sep-93	BNACLP	4,4'-ISOPROPYLIDENEDIPHENOL	71	J		15.91	7	2.88e+2
865	179	Perimeter	BU00033ER	15-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	470	E	10	15.91	7	1.91e+3
865	179	Perimeter	BU00033ER	15-Sep-93	BNACLP	DI-n-OCTYL PHTHALATE	30		10	15.91	7	1.22e+2
865	179	Perimeter	BU00033ER	15-Sep-93	BNACLP	PHENOL	78		10	15.91	7	3.17e+2
865	179	Pathway	BU00037ER	15-Sep-93	BNACLP	1,3-ISOBENZOFURANDIONE	39	J		9.52	13.3	4.98e+1
865	179	Pathway	BU00037ER	15-Sep-93	BNACLP	2-ETHYL-1-HEXANOL	25	J		9.52	13.3	3.20e+1
865	179	Pathway	BU00037ER	15-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	780	E	10	9.52	13.3	9.97e+2
865	179	Pathway	BU00037ER	15-Sep-93	BNACLP	DI-n-OCTYL PHTHALATE	130		10	9.52	13.3	1.66e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.2-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 179

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Radionuclide*	*Result (pCi/l)*	*Error*	*Qualifier*	*Detection Limit (pCi/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (pCi/g)*
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	AMERICIUM-241	0.018	0.008		0.004	9.09	3	9.74e-2
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	GROSS ALPHA	9.0	0.89		0.49	9.09	3	4.87e+1
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	GROSS BETA	13	2.3		2.6	9.09	3	7.03e+1
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	PLUTONIUM-239/240	0.014	0.008		0.004	9.09	3	7.58e-2
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	URANIUM-233,-234	1.9	0.68	B	0.13	9.09	3	1.03e+1
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	URANIUM-235	0.10	0.15	BJ	0.043	9.09	3	5.41e-1
865	179	IHSS	BU00036ER	15-Sep-93	DRADS	URANIUM-238	9.2	1.8	B	0.043	9.09	3	4.98e+1
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	AMERICIUM-241	0.007	0.004	J	0.001	15.91	7	2.84e-2
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	GROSS ALPHA	18	1.3		0.51	15.91	7	7.31e+1
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	GROSS BETA	27	2.8		2.5	15.91	7	1.10e+2
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	PLUTONIUM-239/240	0.005	0.004	J	0.005	15.91	7	2.03e-2
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	RADIUM-226	0.86	0.050	B	0.040	15.91	7	3.49e+0
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	URANIUM-233,-234	3.0	0.79	B	0.12	15.91	7	1.22e+1
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	URANIUM-235	0.17	0.17	BJ	0.035	15.91	7	6.90e-1
865	179	Perimeter	BU00033ER	15-Sep-93	DRADS	URANIUM-238	19	2.9	B	0.062	15.91	7	7.71e+1
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	GROSS ALPHA	120	4.1		0.64	9.52	13.3	1.53e+2
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	GROSS BETA	130	6.9		4.1	9.52	13.3	1.66e+2
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	PLUTONIUM-239/240	0.006	0.006	J	0.006	9.52	13.3	7.67e-3
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	RADIUM-226	0.67	0.050	B	0.070	9.52	13.3	8.56e-1
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	URANIUM-233,-234	18	2.8	B	0.037	9.52	13.3	2.30e+1
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	URANIUM-235	2.3	0.69	B	0.037	9.52	13.3	2.94e+0
865	179	Pathway	BU00037ER	15-Sep-93	DRADS	URANIUM-238	130	17	B	0.065	9.52	13.3	1.66e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.2-3
Smear Sample Results - IHSS 179

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
865	145	179	1	12	24	9.7e+2	1.9e+3	15	42	1.2e+3	3.4e+3
			2	6	15	4.8e+2	1.2e+3	21	39	1.7e+3	3.1e+3
			3	12	12	9.7e+2	9.7e+2	15	27	1.2e+3	2.2e+3
			4	9	0	7.2e+2	0.0e+0	12	42	9.7e+2	3.4e+3
			5	15	9	1.2e+3	7.2e+2	42	45	3.4e+3	3.6e+3
			6	3	15	2.4e+2	1.2e+3	45	36	3.6e+3	2.9e+3
			7	9	12	7.2e+2	9.7e+2	21	51	1.7e+3	4.1e+3
			8	3	0	2.4e+2	0.0e+0	33	99	2.7e+3	8.0e+3
			9	3	9	2.4e+2	7.2e+2	15	36	1.2e+3	2.9e+3
			10	12	0	9.7e+2	0.0e+0	27	36	2.2e+3	2.9e+3
			11	6	24	4.8e+2	1.9e+3	33	60	2.7e+3	4.8e+3
			12	3	0	2.4e+2	0.0e+0	27	54	2.2e+3	4.3e+3
			13	12	0	9.7e+2	0.0e+0	69	66	5.6e+3	5.3e+3
			14	3	39	2.4e+2	3.1e+3	15	72	1.2e+3	5.8e+3
			15	3	18	2.4e+2	1.4e+3	53	69	4.3e+3	5.6e+3
			16	9	12	7.2e+2	9.7e+2	21	90	1.7e+3	7.2e+3
			17	12	6	9.7e+2	4.8e+2	21	15	1.7e+3	1.2e+3
			18	9	0	7.2e+2	0.0e+0	39	72	3.1e+3	5.8e+3
			19	9	6	7.2e+2	4.8e+2	39	30	3.1e+3	2.4e+3
			20	12	0	9.7e+2	0.0e+0	21	66	1.7e+3	5.3e+3
			21	6	42	4.8e+2	3.4e+3	21	69	1.7e+3	5.6e+3
			22	6	0	4.8e+2	0.0e+0	39	72	3.1e+3	5.8e+3
			23	6	15	4.8e+2	1.2e+3	6	39	4.8e+2	3.1e+3

(1) - Calculated assuming 560 mg dust per square meter

Table 3.2-4
Beta and Gamma Dose-Rate Survey Data - IHSS 179

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
865	145	179	1	0	0
			2	0	0
			3	0	0
			4	0	0
			5	0	0
			6	0	0
			7	0	0
			8	0.4	0
			9	0	1.2
			10	0.2	0
			11	0	0
			12	0	0
			13	0	0
			14	0	1.6
			15	0	0
			16	0	0
			17	0	0
			18	0	0
			19	0	0
			20	0	0
			21	0	0
			22	0	0
			23	0	0

Table 3.2-5
Beryllium Smear Data - IHSS 179

Building	Room	IHSS	Area	Pre-Rinsate Smear Sample Beryllium (ug/100cm^2)	Post-Rinsate Smear Sample Beryllium (ug/100cm^2)	Pre-Rinsate Dust Concentration Beryllium (1) (mg/kg)	Post-Rinsate Dust Concentration Beryllium (1) (mg/kg)
865	145	179	1	2	0	3.57e+2	
			2	0	0		
			3	4	1	7.14e+2	1.79e+2
			4	0	0		
			5	0	0		
			6	1	0	1.79e+2	
			7	0	4		7.14e+2
			8	2	1	3.57e+2	1.79e+2
			9	0	0		
			10	0	2		3.57e+2
			11	4	3	7.14e+2	5.36e+2
			12	0	0		
			13	1	1	1.79e+2	1.79e+2
			14	3	0	5.36e+2	
			15	0	0		
			16	0	0		
			17	1	0	1.79e+2	
			18	0	0		
			19	4	2	7.14e+2	3.57e+2
			20	0	0		
			21	0	0		
			22	0	1		1.79e+2
			23		0		

(1) - Values calculated assuming 560 mg dust per square meter of surface

Table 3.3-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 180

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Chemical*	*Result (ug/l)*	*Qualifier*	*Detection Limit (ug/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (mg/kg)*
883	180	Perimeter	BU00026ER	01-Sep-93	BNACLP	1,3-ISOBENZOFURANDIONE	31	J		13.76	12.2	6.24e+1
883	180	Perimeter	BU00026ER	01-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	460	E	10	13.76	12.2	9.26e+2
883	180	Perimeter	BU00026ER	01-Sep-93	BNACLP	DI-n-OCTYL PHTHALATE	32		10	13.76	12.2	6.44e+1
883	180	Perimeter	BU00026ER	01-Sep-93	BNACLP	PHENOL	41		10	13.76	12.2	8.26e+1
883	180	Pathway	BU00027ER	02-Sep-93	BNACLP	1,3-ISOBENZOFURANDIONE	23	J		21.3	12.7	6.89e+1
883	180	Pathway	BU00027ER	02-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	390	E	10	21.3	12.7	1.17e+3
883	180	Pathway	BU00027ER	02-Sep-93	BNACLP	DI-n-BUTYL PHTHALATE	44		10	21.3	12.7	1.32e+2
883	180	Pathway	BU00027ER	02-Sep-93	BNACLP	DI-n-OCTYL PHTHALATE	23		10	21.3	12.7	6.89e+1
883	180	Pathway	BU00027ER	02-Sep-93	BNACLP	PHENOL	47		10	21.3	12.7	1.41e+2
883	180	Pathway	BU00030ER	02-Sep-93	BNACLP	4,4'-ISOPROPYLIDENEDIPHENOL	17	J		12.87	13.9	2.81e+1
883	180	Pathway	BU00030ER	02-Sep-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	260		10	12.87	13.9	4.30e+2
883	180	Pathway	BU00030ER	02-Sep-93	BNACLP	DI-n-BUTYL PHTHALATE	19	J	10	12.87	13.9	3.14e+1
883	180	Pathway	BU00030ER	02-Sep-93	BNACLP	DI-n-OCTYL PHTHALATE	14	J	10	12.87	13.9	2.31e+1
883	180	Pathway	BU00030ER	02-Sep-93	BNACLP	PHENOL	25		10	12.87	13.9	4.13e+1

(1) - Calculated assuming 560 mg dust per square meter

Table 3.3-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 180

Building	IHSS	Location	Sample Number	Sample Date	Test Group	Radionuclide	Result (pCi/l)	Error	Qualifier	Detection Limit (pCi/l)	Rinsate Volume (l)	Rinsate Area (m^2)	Concentration in Dust (1) (pCi/g)
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	AMERICIUM-241	0.008	0.006	J	0.002	19.81	7.8	3.63e-2
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	GROSS ALPHA	50	1.9		0.34	19.81	7.8	2.27e+2
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	GROSS BETA	55	3.7		2.6	19.81	7.8	2.49e+2
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	PLUTONIUM-239/240	0.005	0.006	J	0.004	19.81	7.8	2.27e-2
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	RADIUM-226	0.57	0.080	B	0.11	19.81	7.8	2.59e+0
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	URANIUM-233,-234	12	1.9	B	0.056	19.81	7.8	5.44e+1
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	URANIUM-235	0.30	0.22	BJ	0.031	19.81	7.8	1.36e+0
883	180	IHSS	BU00023ER	01-Sep-93	DRADS	URANIUM-238	58	7.3	B	0.031	19.81	7.8	2.63e+2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	AMERICIUM-241	0.007	0.006	J	0.002	13.76	12.2	1.41e-2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	GROSS ALPHA	270	4.8		0.58	13.76	12.2	5.44e+2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	GROSS BETA	300	8.1		2.7	13.76	12.2	6.04e+2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	PLUTONIUM-239/240	0.007	0.006	J	0.006	13.76	12.2	1.41e-2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	RADIUM-226	0.40	0.060	BJ	0.060	13.76	12.2	8.06e-1
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	URANIUM-233,-234	60	9.1	B	0.087	13.76	12.2	1.21e+2
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	URANIUM-235	9.7	2.0		0.087	13.76	12.2	1.95e+1
883	180	Perimeter	BU00026ER	01-Sep-93	DRADS	URANIUM-238	380	54	B	0.049	13.76	12.2	7.65e+2
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	GROSS ALPHA	150	3.5		0.41	21.3	12.7	4.49e+2
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	GROSS BETA	180	6.4		3.0	21.3	12.7	5.39e+2
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	PLUTONIUM-239/240	0.006	0.004	J	0.004	21.3	12.7	1.80e-2
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	RADIUM-226	0.46	0.11	BJ	0.15	21.3	12.7	1.38e+0
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	URANIUM-233,-234	37	5.3	B	0.14	21.3	12.7	1.11e+2
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	URANIUM-235	4.4	1.1		0.12	21.3	12.7	1.32e+1
883	180	Pathway	BU00027ER	02-Sep-93	DRADS	URANIUM-238	220	28	B	0.15	21.3	12.7	6.59e+2
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	AMERICIUM-241	0.006	0.004	J	0.002	12.87	13.9	9.92e-3
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	GROSS ALPHA	100	3.1		0.59	12.87	13.9	1.65e+2
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	GROSS BETA	140	5.6		2.7	12.87	13.9	2.31e+2
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	PLUTONIUM-239/240	0.004	0.004	J	0.001	12.87	13.9	6.61e-3
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	RADIUM-226	0.28	0.070	BJ	0.10	12.87	13.9	4.63e-1
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	URANIUM-233,-234	21	3.1	B	0.034	12.87	13.9	3.47e+1
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	URANIUM-235	1.3	0.48	B	0.034	12.87	13.9	2.15e+0
883	180	Pathway	BU00030ER	02-Sep-93	DRADS	URANIUM-238	110	14	B	0.060	12.87	13.9	1.82e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.3-3
Smear Sample Results - IHSS 180

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
883	104	180	1	6	0	4.8e+2	0.0e+0	9	0	7.2e+2	0.0e+0
			2	9	18	7.2e+2	1.4e+3	6	0	4.8e+2	0.0e+0
			3	15	0	1.2e+3	0.0e+0	12	0	9.7e+2	0.0e+0
			4	6	0	4.8e+2	0.0e+0	6	9	4.8e+2	7.2e+2
			5	12	0	9.7e+2	0.0e+0	21	30	1.7e+3	2.4e+3
			6	15	15	1.2e+3	1.2e+3	6	24	4.8e+2	1.9e+3
			7	15	0	1.2e+3	0.0e+0	18	21	1.4e+3	1.7e+3
			8	9	24	7.2e+2	1.9e+3	6	24	4.8e+2	1.9e+3
			9	9	21	7.2e+2	1.7e+3	12	21	9.7e+2	1.7e+3
			10	6	27	4.8e+2	2.2e+3	9	69	7.2e+2	5.6e+3
			11	6	0	4.8e+2	0.0e+0	6	0	4.8e+2	0.0e+0
			12	15	30	1.2e+3	2.4e+3	6	36	4.8e+2	2.9e+3
			13	15	45	1.2e+3	3.6e+3	30	6	2.4e+3	4.8e+2
			14	12	21	9.7e+2	1.7e+3	3	24	2.4e+2	1.9e+3
			15	15	18	1.2e+3	1.4e+3	9	12	7.2e+2	9.7e+2
			16	6	0	4.8e+2	0.0e+0	3	18	2.4e+2	1.4e+3
			17	9	12	7.2e+2	9.7e+2	18	12	1.4e+3	9.7e+2
			18	9	0	7.2e+2	0.0e+0	9	15	7.2e+2	1.2e+3
			19	15	9	1.2e+3	7.2e+2	18	9	1.4e+3	7.2e+2
			20	6	9	4.8e+2	7.2e+2	3	30	2.4e+2	2.4e+3
			21	6	18	4.8e+2	1.4e+3	9	0	7.2e+2	0.0e+0
			22	3	57	2.4e+2	4.6e+3	12	24	9.7e+2	1.9e+3
			23	0	0	0.0e+0	0.0e+0	9	48	7.2e+2	3.9e+3
			24	3	0	2.4e+2	0.0e+0	18	0	1.4e+3	0.0e+0
			25	9	12	7.2e+2	9.7e+2	12	0	9.7e+2	0.0e+0
			26	6	0	4.8e+2	0.0e+0	45	3	3.6e+3	2.4e+2
			27	18	12	1.4e+3	9.7e+2	21	33	1.7e+3	2.7e+3
			28	9	18	7.2e+2	1.4e+3	21	6	1.7e+3	4.8e+2
			29	3	27	2.4e+2	2.2e+3	9	36	7.2e+2	2.9e+3
			30	6	39	4.8e+2	3.1e+3	15	39	1.2e+3	3.1e+3
			31	6	0	4.8e+2	0.0e+0	21	54	1.7e+3	4.3e+3
			32	21	0	1.7e+3	0.0e+0	21	42	1.7e+3	3.4e+3
			33	6	0	4.8e+2	0.0e+0	6	57	4.8e+2	4.6e+3
			34	6	30	4.8e+2	2.4e+3	21	45	1.7e+3	3.6e+3
			35	9	9	7.2e+2	7.2e+2	3	21	2.4e+2	1.7e+3
			36	9	3	7.2e+2	2.4e+2	9	6	7.2e+2	4.8e+2

Table 3.3-3
Smear Sample Results - IHSS 180

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
			37	0	36	0.0e+0	2.9e+3	0	3	0.0e+0	2.4e+2
			38	9	6	7.2e+2	4.8e+2	21	15	1.7e+3	1.2e+3
			39	3	0	2.4e+2	0.0e+0	12	21	9.7e+2	1.7e+3
			40	21	0	1.7e+3	0.0e+0	3	45	2.4e+2	3.6e+3
			41	0	21	0.0e+0	1.7e+3	12	0	9.7e+2	0.0e+0
			42	12	0	9.7e+2	0.0e+0	6	0	4.8e+2	0.0e+0
			43	0	12	0.0e+0	9.7e+2	12	0	9.7e+2	0.0e+0
			44	0	0	0.0e+0	0.0e+0	3	3	2.4e+2	2.4e+2
			45	0	0	0.0e+0	0.0e+0	6	0	4.8e+2	0.0e+0
			46	0	0	0.0e+0	0.0e+0	9	0	7.2e+2	0.0e+0
			47	18	18	1.4e+3	1.4e+3	3	12	2.4e+2	9.7e+2
			48	12	12	9.7e+2	9.7e+2	3	0	2.4e+2	0.0e+0
			49	6	6	4.8e+2	4.8e+2	6	0	4.8e+2	0.0e+0

(1) - Calculated assuming 560 mg dust per square meter

Table 3.3-4
Beta and Gamma Dose-Rate Survey Data - IHSS 180

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
883	104	180	1	0.1	0
			2	0	0.4
			3	0	0.4
			4	0	0
			5	0.1	1.2
			6	0	0.4
			7	0.1	0
			8	0	0
			9	0	0.4
			10	0	0.4
			11	0	0.4
			12	0	0
			13	0	0
			14	0	0.4
			15	0	0.4
			16	0	0.4
			17	0	0.4
			18	0.1	2
			19	0	0.8
			20	0.1	2
			21	0	0.8
			22	0.1	0
			23	0.5	11.2
			24	0	0
			25	0	0.8
			26	0	0.8
			27	0.4	0.4
			28	0	0.1
			29	0.1	4.4
			30	0.3	5.6
			31	0.2	3.6
			32	0	0.2
			33	0.3	2.4
			34	0.1	0.8
			35	0.1	0.4
			36	0	0.4
			37	0	0
			38	0	0
			39	0	0.4
			40	0	0
			41	0.3	4.4
			42	0.1	3.2

Table 3.3-4
Beta and Gamma Dose-Rate Survey Data - IHSS 180

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
883	104	180	43	0.1	2.8
			44	0	0.4
			45	0	0.4
			46	0	0.4
			47	0.1	0.4
			48	0	1.2
			49	0	0.4

Table 3.3-5
Beryllium Smear Data - IHSS 180

Building	Room	IHSS	Area	Pre-Rinsate Smear Sample Beryllium (ug/100cm^2)	Post-Rinsate Smear Sample Beryllium (ug/100cm^2)	Pre-Rinsate Dust Concentration Beryllium (1) (mg/kg)	Post-Rinsate Dust Concentration Beryllium (1) (mg/kg)
883	104	180	1	0	1		1.79e+2
			2	0	0		
			3	0	0		
			4	1	0	1.79e+2	
			5	3	0	5.36e+2	
			6	0	0		
			7	0	2		3.57e+2
			8	0	0		
			9	0	0		
			10	1	0	1.79e+2	
			11	0	0		
			12	0	0		
			13	0	0		
			14	0	0		
			15	0	0		
			16	0	0		
			17	0	0		
			18	0	0		
			19	3	0	5.36e+2	
			20	1	0	1.79e+2	
			21	0	0		
			22	0	3		5.36e+2
			23	0	0		
			24	0	0		
			25	4	0	7.14e+2	
			26	1	0	1.79e+2	
			27	0	0		
			28	0	0		
			29	0	0		
			30	0	0		
			31	0	3		5.36e+2
			32	0	0		
			33	0	23		4.11e+3
			34	1	2	1.79e+2	3.57e+2
			35	4	8	7.14e+2	1.43e+3
			36	0	6		1.07e+3
			37	0	0		
			38	0	6		1.07e+3
			39	0	0		
			40	0	0		
			41	0	2		3.57e+2
			42	0	0		
			43	0	0		
			44	14	0	2.50e+3	
			45	0	0		
			46	0	27		4.82e+3
			47	0	33		5.89e+3
			48	1	14	1.79e+2	2.50e+3
			49	0	1		1.79e+2

(1) - Values calculated assuming 560 mg dust per square meter of surface

Table 3.4-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 204

Building	IHSS	Location	Sample Number	Sample Date	Test Group	Chemical	Result (ug/l)	Qualifier	Detection Limit (ug/l)	Rinsate Volume (l)	Rinsate Area (m^2)	Concentration in Dust (1) (mg/kg)
447	204	Room 501	BU00043ER	11-Oct-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	1200	E	10	11.27	6	4.03e+3
447	204	Room 501	BU00043ER	11-Oct-93	BNACLP	Dodecanoic acid	65	J		11.27	6	2.18e+2
447	204	Room 501	BU00043ER	11-Oct-93	BNACLP	PHENOL	24		10	11.27	6	8.05e+1
447	204	Room 502	BU00044ER	11-Oct-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	590	E	10	12.03	23.5	5.39e+2
447	204	Room 502	BU00044ER	11-Oct-93	BNACLP	DI-n-OCTYL PHTHALATE	12		10	12.03	23.5	1.10e+1
447	204	Room 502	BU00044ER	11-Oct-93	BNACLP	PHENOL	23		10	12.03	23.5	2.10e+1
447	204	Inlet	BU00045ER	11-Oct-93	BNACLP	2-Pyrrolidinone, 1-methyl-	120	J		6.22	2	6.66e+2
447	204	Inlet	BU00045ER	11-Oct-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	230	E	10	6.22	2	1.28e+3
447	204	Inlet	BU00045ER	11-Oct-93	BNACLP	DI-n-OCTYL PHTHALATE	28		10	6.22	2	1.56e+2
447	204	Inlet	BU00045ER	11-Oct-93	BNACLP	Hexadecanoic Acid	7	J		6.22	2	3.89e+1
447	204	Inlet	BU00045ER	11-Oct-93	BNACLP	PHENOL	98		10	6.22	2	5.44e+2
447	204	Room 31	BU00047ER	09-Nov-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	240	E	10	16.75	5.7	1.26e+3
447	204	Room 32	BU00050ER	09-Nov-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	160		10	12.51	27.7	1.29e+2
447	204	Room 32	BU00050ER	09-Nov-93	BNACLP	DI-n-OCTYL PHTHALATE	16		10	12.51	27.7	1.29e+1
447	204	Room 32	BU00050ER	09-Nov-93	BNACLP	PHENOL	58		10	12.51	27.7	4.68e+1
447	204	Outlet	BU00051ER	09-Nov-93	BNACLP	2-NITROPHENOL	13		10	5.43	1	1.26e+2
447	204	Outlet	BU00051ER	09-Nov-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	57		10	5.43	1	5.53e+2
447	204	Outlet	BU00051ER	09-Nov-93	BNACLP	DI-n-OCTYL PHTHALATE	43		10	5.43	1	4.17e+2
447	204	Outlet	BU00051ER	09-Nov-93	BNACLP	PHENOL	440	E	10	5.43	1	4.27e+3

(1) - Calculated assuming 560 mg dust per square meter

Table 3.4-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 204

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Radionuclide*	*Result (pCi/l)*	*Error*	*Qualifier*	*Detection Limit (pCi/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (pCi/g)*
447	204	Wash Rack	BU00040ER	11-Oct-93	DRADS	GROSS ALPHA	150	8.0		1	23.9	8.2	7.81e+2
447	204	Wash Rack	BU00040ER	11-Oct-93	DRADS	GROSS BETA	72	3.6		2	23.9	8.2	3.75e+2
447	204	Wash Rack	BU00040ER	11-Oct-93	DRADS	URANIUM-233,-234	24	2.9		0.5	23.9	8.2	1.25e+2
447	204	Wash Rack	BU00040ER	11-Oct-93	DRADS	URANIUM-235	3.5	0.77		0.2	23.9	8.2	1.82e+1
447	204	Wash Rack	BU00040ER	11-Oct-93	DRADS	URANIUM-238	180	19		0.5	23.9	8.2	9.37e+2
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	GROSS ALPHA	36	3.9		1	11.27	6	1.21e+2
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	GROSS BETA	35	2.6		2	11.27	6	1.17e+2
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	PLUTONIUM-239/240	0.013	0.011	B	0.01	11.27	6	4.36e-2
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	URANIUM-233,-234	4.9	1.2		0.6	11.27	6	1.64e+1
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	URANIUM-235	0.88	0.49		0.5	11.27	6	2.95e+0
447	204	Room 501	BU00043ER	11-Oct-93	DRADS	URANIUM-238	34	5.6		0.5	11.27	6	1.14e+2
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	GROSS ALPHA	520	17		2	12.03	23.5	4.75e+2
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	GROSS BETA	680	10		2	12.03	23.5	6.22e+2
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	PLUTONIUM-239/240	0.016	0.007	B	0.005	12.03	23.5	1.46e-2
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	URANIUM-233,-234	110	10		0.6	12.03	23.5	1.01e+2
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	URANIUM-235	8.4	3.2		7	12.03	23.5	7.68e+0
447	204	Room 502	BU00044ER	11-Oct-93	DRADS	URANIUM-238	840	77		0.6	12.03	23.5	7.68e+2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	AMERICIUM-241	0.002	0.003			16.75	5.7	1.05e-2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	GROSS ALPHA	0.002	0.003			16.75	5.7	1.05e-2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	GROSS BETA	0.002	0.003			16.75	5.7	1.05e-2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	PLUTONIUM-239/240	0.004	0.004			16.75	5.7	2.10e-2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	URANIUM-233,-234	28.75	3.105			16.75	5.7	1.51e+2
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	URANIUM-235	4.383	0.778			16.75	5.7	2.30e+1
447	204	Room 31	BU00047ER*	9-Nov-93	DRADS	URANIUM-238	206.2	0.003			16.75	5.7	1.08e+3
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	AMERICIUM-241	0.000	0.003			12.51	27.7	0.00e+0
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	GROSS ALPHA	6420	60.211			12.51	27.7	5.18e+3
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	PLUTONIUM-239/240	0.014	0.005			12.51	27.7	1.13e-2
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	URANIUM-233,-234	698.2	914.732			12.51	27.7	5.63e+2
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	URANIUM-235	704.4	666.444			12.51	27.7	5.68e+2
447	204	Room 32	BU00050ER*	9-Nov-93	DRADS	URANIUM-238	7564	1965.88			12.51	27.7	6.10e+3

(1) - Calculated assuming 560 mg dust per square meter
* - These data were entered manually and were not available on RFEDS at the time of publication

Table 3.4-3
Smear Sample Results - IHSS 204

				Pre-Rinsate Smear Sample		*Pre-Rinsate Dust Concentration (1)*		*Post-Rinsate Smear Sample*		*Post-Rinsate Dust Concentration (1)*	
Building	*Room*	*IHSS*	*Area*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*
447	31	204	1	24	0	1.9e+3	0.0e+0				
			2	12	6	9.7e+2	4.8e+2				
			3	6	0	4.8e+2	0.0e+0				
			4	30	0	2.4e+3	0.0e+0				
			5	15	33	1.2e+3	2.7e+3				
			6	12	9	9.7e+2	7.2e+2				
447	32	204	7	2600	13252	2.1e+5	1.1e+6				
			8	2000	11363	1.6e+5	9.1e+5				
			9	2400	18939	1.9e+5	1.5e+6				
			10	2000	14204	1.6e+5	1.1e+6				
			11	3200	28409	2.6e+5	2.3e+6				
			12	5000	37878	4.0e+5	3.0e+6				
			13	2200	12310	1.8e+5	9.9e+5				
			14	3000	16098	2.4e+5	1.3e+6				
			15	2600	12310	2.1e+5	9.9e+5				
			16	4000	28409	3.2e+5	2.3e+6				
			17	4000	23674	3.2e+5	1.9e+6				
			18	14000	132575	1.1e+6	1.1e+7				
			19	6000	57878	4.8e+5	4.7e+6				
			20	11000	71522	8.8e+5	5.8e+6				
			21	6000	56818	4.8e+5	4.6e+6				
			22	6000	28409	4.8e+5	2.3e+6				
			23	8000	47348	6.4e+5	3.8e+6				
			24	12000	151515	9.7e+5	1.2e+7				
			25	1600	12310	1.3e+5	9.9e+5				
			26	4000	18939	3.2e+5	1.5e+6				
			27	3000	12310	2.4e+5	9.9e+5				
			28	1400	9469	1.1e+5	7.6e+5				
			29	12000	104166	9.7e+5	8.4e+6				
			30	3000	16099	2.4e+5	1.3e+6				
			31	6000	66290	4.8e+5	5.3e+6				
			32	5000	66290	4.0e+5	5.3e+6				
			33	8000	47350	6.4e+5	3.8e+6				
			34	10000	66290	8.0e+5	5.3e+6				

Table 3.4-3
Smear Sample Results - IHSS 204

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
447	501	204	1	0	0	0.0e+0	0.0e+0				
			2	12	3	9.7e+2	2.4e+2				
			3	15	0	1.2e+3	0.0e+0				
			4	30	0	2.4e+3	0.0e+0				
			5	6	60	4.8e+2	4.8e+3				
			6	12	0	9.7e+2	0.0e+0				
447	502	204	7	102	114	8.2e+3	9.2e+3				
			8	132	168	1.1e+4	1.4e+4				
			9	99	162	8.0e+3	1.3e+4				
			10	222	243	1.8e+4	2.0e+4				
			11	129	219	1.0e+4	1.8e+4				
			12	153	222	1.2e+4	1.8e+4				
			13	174	279	1.4e+4	2.2e+4				
			14	123	156	9.9e+3	1.3e+4				
			15	198	213	1.6e+4	1.7e+4				
			16	1359	3834	1.1e+5	3.1e+5				
			17	336	588	2.7e+4	4.7e+4				
			18	294	426	2.4e+4	3.4e+4				
			19	342	576	2.8e+4	4.6e+4				
			20	324	594	2.6e+4	4.8e+4				
			21	135	285	1.1e+4	2.3e+4				
			22	279	372	2.2e+4	3.0e+4				
			23	273	504	2.2e+4	4.1e+4				
			24	669	1551	5.4e+4	1.2e+5				
			25	417	1029	3.4e+4	8.3e+4				
			26	243	303	2.0e+4	2.4e+4				
			27	708	2331	5.7e+4	1.9e+5				
			28	447	927	3.6e+4	7.5e+4				
			29	408	636	3.3e+4	5.1e+4				
			30	486	711	3.9e+4	5.7e+4				
			31	375	768	3.0e+4	6.2e+4				
			32	411	588	3.3e+4	4.7e+4				
			33	189	339	1.5e+4	2.7e+4				

Table 3.4-3
Smear Sample Results - IHSS 204

				Pre-Rinsate Smear Sample		*Pre-Rinsate Dust Concentration (1)*		*Post-Rinsate Smear Sample*		*Post-Rinsate Dust Concentration (1)*	
Building	*Room*	*IHSS*	*Area*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*
447	501WR	204	1	129	750	1.0e+4	6.0e+4				
			2	216	1194	1.7e+4	9.6e+4				
			3	99	132	8.0e+3	1.1e+4				
			4	228	807	1.8e+4	6.5e+4				
			5	42	18	3.4e+3	1.4e+3				
			6	12	0	9.7e+2	0.0e+0				
			7	3	0	2.4e+2	0.0e+0				
			8	3	6	2.4e+2	4.8e+2				
			9	12	6	9.7e+2	4.8e+2				
			10	9		7.2e+2	0.0e+0				

(1) - Calculated assuming 560 mg dust per square meter

Table 3.5-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 211

Building	IHSS	Location	Sample Number	Sample Date	Test Group	Chemical	Result (ug/l)	Qualifier	Detection Limit (ug/l)	Rinsate Volume (l)	Rinsate Area (m^2)	Concentration in Dust (1) (mg/kg)
881	211	IHSS	BU00002ER	09-Aug-93	BNACLP	2-METHYLPHENOL	110		10	10.7	17.8	1.18e+2
881	211	IHSS	BU00002ER	09-Aug-93	BNACLP	BENZOIC ACID	270	E	50	10.7	17.8	2.90e+2
881	211	IHSS	BU00002ER	09-Aug-93	BNACLP	BENZYL ALCOHOL	10		10	10.7	17.8	1.07e+1
881	211	IHSS	BU00002ER	09-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	54		10	10.7	17.8	5.80e+1
881	211	IHSS	BU00002ER	09-Aug-93	BNACLP	PHENOL	170	E	10	10.7	17.8	1.82e+2
881	211	IHSS	BU00002ER	09-Aug-93	DMETADD	SILICON	9250		100	10.7	17.8	9.93e+3
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	CADMIUM	17.0		5	10.7	17.8	1.82e+1
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	CALCIUM	37400		5000	10.7	17.8	4.01e+4
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	COPPER	34.4		25	10.7	17.8	3.69e+1
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	IRON	135		100	10.7	17.8	1.45e+2
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	LEAD	9.1		5	10.7	17.8	9.77e+0
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	POTASSIUM	25600		5000	10.7	17.8	2.75e+4
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	SODIUM	53900		5000	10.7	17.8	5.79e+4
881	211	IHSS	BU00002ER	09-Aug-93	DSMETCLP	ZINC	40.5		20	10.7	17.8	4.35e+1
881	211	IHSS	BU00002ER	09-Aug-93	VOACLP	TOTAL XYLENES	9		5	10.7	17.8	9.66e+0
881	211	Perimeter	BU00006ER	11-Aug-93	DMETADD	SILICON	5290		100	9.47	3	2.98e+4
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	CADMIUM	17.3		5	9.47	3	9.75e+1
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	CALCIUM	15000		5000	9.47	3	8.46e+4
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	COPPER	36.0		25	9.47	3	2.03e+2
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	IRON	108		100	9.47	3	6.09e+2
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	LEAD	6.9		5	9.47	3	3.89e+1
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	POTASSIUM	10900		5000	9.47	3	6.14e+4
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	SODIUM	23100		5000	9.47	3	1.30e+5
881	211	Perimeter	BU00006ER	11-Aug-93	DSMETCLP	ZINC	58.7		20	9.47	3	3.31e+2
881	211	Pathway	BU00008ER	11-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	300	E	10	15.32	11	7.46e+2
881	211	Pathway	BU00008ER	11-Aug-93	BNACLP	DI-n-BUTYL PHTHALATE	34		10	15.32	11	8.46e+1
881	211	Pathway	BU00008ER	11-Aug-93	BNACLP	DI-n-OCTYL PHTHALATE	24		10	15.32	11	5.97e+1
881	211	Pathway	BU00008ER	11-Aug-93	BNACLP	PHENOL	67		10	15.32	11	1.67e+2
881	211	Pathway	BU00008ER	11-Aug-93	DMETADD	SILICON	5110		100	15.32	11	1.27e+4
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	CALCIUM	13600		5000	15.32	11	3.38e+4
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	COPPER	43.7		25	15.32	11	1.09e+2
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	IRON	323		100	15.32	11	8.03e+2
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	LEAD	7.5		5	15.32	11	1.87e+1
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	POTASSIUM	15300		5000	15.32	11	3.81e+4
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	SODIUM	28800		5000	15.32	11	7.16e+4
881	211	Pathway	BU00008ER	11-Aug-93	DSMETCLP	ZINC	91.8		20	15.32	11	2.28e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.5-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 211

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Radionuclide*	*Result (pCi/l)*	*Error*	*Qualifier*	*Detection Limit (pCi/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (pCi/g)*
881	211	IHSS	BU00002ER	09-Aug-93	DRADS	AMERICIUM-241	0.007	0.006	BJ	0.004	10.7	17.8	7.51e-3
881	211	IHSS	BU00002ER	09-Aug-93	DRADS	GROSS ALPHA		0.93			10.7	17.8	
881	211	IHSS	BU00002ER	09-Aug-93	DRADS	GROSS BETA		2.5			10.7	17.8	
881	211	IHSS	BU00002ER	09-Aug-93	DRADS	PLUTONIUM-239/240	0.15	0.024	B	0.003	10.7	17.8	1.61e-1
881	211	IHSS	BU00002ER	09-Aug-93	DRADS	RADIUM-226	0.65	0.19	B	0.24	10.7	17.8	6.98e-1
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	GROSS ALPHA		0.41			9.47	3	
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	GROSS BETA		2.1			9.47	3	
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	PLUTONIUM-239/240	0.018	0.008	B	0.002	9.47	3	1.01e-1
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	URANIUM-233,-234	1.4	0.56	B	0.11	9.47	3	7.89e+0
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	URANIUM-235	0.13	0.17	J	0.11	9.47	3	7.33e-1
881	211	Perimeter	BU00006ER	11-Aug-93	DRADS	URANIUM-238	0.13	0.17	J	0.11	9.47	3	7.33e-1
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	GROSS ALPHA		1.4			15.32	11	
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	GROSS BETA		2.2			15.32	11	
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	PLUTONIUM-239/240	0.020	0.008	B	0.001	15.32	11	4.97e-2
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	URANIUM-233,-234	1.5	0.66		0.14	15.32	11	3.73e+0
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	URANIUM-235	0.19	0.22	J	0.053	15.32	11	4.73e-1
881	211	Pathway	BU00008ER	11-Aug-93	DRADS	URANIUM-238	0.32	0.29	J	0.053	15.32	11	7.96e-1

(1) - Calculated assuming 560 mg dust per square meter

Table 3.5-3
Smear Sample Results - IHSS 211

				Pre-Rinsate Smear Sample		Pre-Rinsate Dust Concentration (1)		Post-Rinsate Smear Sample		Post-Rinsate Dust Concentration (1)	
Building	Room	IHSS	Area	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)	Alpha (dpm/100 cm^2)	Beta (dpm/100 cm^2)	Alpha (pCi/g)	Beta (pCi/g)
881	266B	211	1	6	0	4.8e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			2	0	0	0.0e+0	0.0e+0	0	0	0.0e+0	0.0e+0
			3	0	18	0.0e+0	1.4e+3	0	24	0.0e+0	1.9e+3
			4	3	51	2.4e+2	4.1e+3	0	0	0.0e+0	0.0e+0
			5	0	0	0.0e+0	0.0e+0	0	24	0.0e+0	1.9e+3
			6	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			7	3	0	2.4e+2	0.0e+0	0	3	0.0e+0	2.4e+2
			8	3	36	2.4e+2	2.9e+3	6	12	4.8e+2	9.7e+2
			9	0	0	0.0e+0	0.0e+0	6	27	4.8e+2	2.2e+3
			10	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			11	0	0	0.0e+0	0.0e+0	0	3	0.0e+0	2.4e+2
			12	0	0	0.0e+0	0.0e+0	3	0	2.4e+2	0.0e+0
			13	0	0	0.0e+0	0.0e+0	0	0	0.0e+0	0.0e+0
			14	3	6	2.4e+2	4.8e+2	0	0	0.0e+0	0.0e+0
			15	6	33	4.8e+2	2.7e+3	3	24	2.4e+2	1.9e+3
			16	6	3	4.8e+2	2.4e+2	9	0	7.2e+2	0.0e+0
			17	0	36	0.0e+0	2.9e+3	3	27	2.4e+2	2.2e+3
			18	0	9	0.0e+0	7.2e+2	0	3	0.0e+0	2.4e+2
			19	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			20	3	0	2.4e+2	0.0e+0	0	6	0.0e+0	4.8e+2
			21	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			22	0	0	0.0e+0	0.0e+0	3	0	2.4e+2	0.0e+0
			23	0	0	0.0e+0	0.0e+0	0	27	0.0e+0	2.2e+3
			24	0	0	0.0e+0	0.0e+0	3	3	2.4e+2	2.4e+2
			25	0	0	0.0e+0	0.0e+0	3	15	2.4e+2	1.2e+3
			26	3	0	2.4e+2	0.0e+0	0	18	0.0e+0	1.4e+3
			27	0	0	0.0e+0	0.0e+0	3	0	2.4e+2	0.0e+0
			28	6	0	4.8e+2	0.0e+0	3	15	2.4e+2	1.2e+3
			29	0	0	0.0e+0	0.0e+0	3	0	2.4e+2	0.0e+0
			30	0	0	0.0e+0	0.0e+0	0	3	0.0e+0	2.4e+2
			31	3	0	2.4e+2	0.0e+0	0	0	0.0e+0	0.0e+0
			32	0	21	0.0e+0	1.7e+3	0	0	0.0e+0	0.0e+0

(1) - Calculated assuming 560 mg dust per square meter

Table 3.5-4
Beta and Gamma Dose-Rate Survey Data - IHSS 211

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
881	266B	211	1	0	0
			2	0	0
			3	0	0
			4	0	0
			5	0	0
			6	0	0
			7	0	0
			8	0	0
			9	0	0
			10	0	0
			11	0	0
			12	0	0
			13	0	0
			14	0	0
			15	0	0
			16	0	0.4
			17	0	0.4
			18	0	0
			19	0	0
			20	0	0
			21	0	0
			22	0	0
			23	0	0
			24	0	0
			25	0	0
			26	0	0
			27	0	0
			28	0	0
			29	0	0
			30	0	0
			31	0	0
			32	0	0

Table 3.6-1
Hot Water Rinsate Chemical Results (Hits Only) - IHSS 217

Building	IHSS	Location	Sample Number	Sample Date	Test Group	Chemical	Result (ug/l)	Qualifier	Detection Limit (ug/l)	Rinsate Volume (l)	Rinsate Area (m^2)	Concentration in Dust (1) (mg/kg)
881	217	IHSS	BU00017ER	17-Aug-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	53		10	22.97	6.1	3.56e+2
881	217	IHSS	BU00017ER	17-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	21		10	22.97	6.1	1.41e+2
881	217	IHSS	BU00017ER	17-Aug-93	BNACLP	PHENOL	18		10	22.97	6.1	1.21e+2
881	217	IHSS	BU00017ER	17-Aug-93	DMETADD	LITHIUM	256		100	22.97	6.1	1.72e+3
881	217	IHSS	BU00017ER	17-Aug-93	DMETADD	SILICON	3630		100	22.97	6.1	2.44e+4
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	BERYLLIUM	7.2		5	22.97	6.1	4.84e+1
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	CADMIUM	75.8		5	22.97	6.1	5.10e+2
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	CALCIUM	42300		5000	22.97	6.1	2.84e+5
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	CHROMIUM	37.5		10	22.97	6.1	2.52e+2
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	COBALT	72.2		50	22.97	6.1	4.85e+2
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	COPPER	281		25	22.97	6.1	1.89e+3
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	IRON	143		100	22.97	6.1	9.62e+2
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	MAGNESIUM	14000		5000	22.97	6.1	9.41e+4
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	MANGANESE	1200		15	22.97	6.1	8.07e+3
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	MERCURY	1.6		.2	22.97	6.1	1.08e+1
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	NICKEL	5630		40	22.97	6.1	3.79e+4
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	POTASSIUM	5270		5000	22.97	6.1	3.54e+4
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	SILVER	22.1		10	22.97	6.1	1.49e+2
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	SODIUM	17400		5000	22.97	6.1	1.17e+5
881	217	IHSS	BU00017ER	17-Aug-93	DSMETCLP	ZINC	986		20	22.97	6.1	6.63e+3
881	217	IHSS	BU00017ER	17-Aug-93	VOACLP	4-METHYL-2-PENTANONE	26		10	22.97	6.1	1.75e+2
881	217	IHSS	BU00017ER	17-Aug-93	VOACLP	CHLOROFORM	5		5	22.97	6.1	3.36e+1
881	217	IHSS	BU00017ER	17-Aug-93	VOACLP	TOTAL XYLENES	11		5	22.97	6.1	7.40e+1
881	217	IHSS	BU00017ER	17-Aug-93	WQPL	CYANIDE	142		5	22.97	6.1	9.55e+2
881	217	Perimeter	BU00020ER	17-Aug-93	BNACLP	BENZYL ALCOHOL	26		10	14.34	4.6	1.45e+2
881	217	Perimeter	BU00020ER	17-Aug-93	BNACLP	BIS(2-ETHYLHEXYL)PHTHALATE	140		10	14.34	4.6	7.79e+2
881	217	Perimeter	BU00020ER	17-Aug-93	BNACLP	BUTYL BENZYL PHTHALATE	270		10	14.34	4.6	1.50e+3
881	217	Perimeter	BU00020ER	17-Aug-93	BNACLP	PHENOL	31		10	14.34	4.6	1.73e+2
881	217	Perimeter	BU00020ER	17-Aug-93	DMETADD	SILICON	3800		100	14.34	4.6	2.12e+4
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	CADMIUM	15.2		5	14.34	4.6	8.46e+1
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	CALCIUM	11100		5000	14.34	4.6	6.18e+4
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	COPPER	165		25	14.34	4.6	9.19e+2
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	IRON	163		100	14.34	4.6	9.07e+2
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	MANGANESE	21.7		15	14.34	4.6	1.21e+2
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	MERCURY	3.2		.2	14.34	4.6	1.78e+1
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	NICKEL	114		40	14.34	4.6	6.35e+2
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	POTASSIUM	20100		5000	14.34	4.6	1.12e+5
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	SODIUM	25400		5000	14.34	4.6	1.41e+5
881	217	Perimeter	BU00020ER	17-Aug-93	DSMETCLP	ZINC	190		20	14.34	4.6	1.06e+3

(1) - Calculated assuming 560 mg dust per square meter

Table 3.6-2
Hot Water Rinsate Radionuclide Results (Hits Only) - IHSS 217

Building	*IHSS*	*Location*	*Sample Number*	*Sample Date*	*Test Group*	*Radionuclide*	*Result (pCi/l)*	*Error*	*Qualifier*	*Detection Limit (pCi/l)*	*Rinsate Volume (l)*	*Rinsate Area (m^2)*	*Concentration in Dust (1) (pCi/g)*
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	AMERICIUM-241		0.032			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	GROSS ALPHA		1.7			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	GROSS BETA		2.6			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	PLUTONIUM-239/240		0.014			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	RADIUM-226	0.18	0.040	BJ	0.060	22.97	6.1	1.21e+0
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	URANIUM-233,-234		3.3			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	URANIUM-235		0.43			22.97	6.1	
881	217	IHSS	BU00017ER	17-Aug-93	DRADS	URANIUM-238		2.5			22.97	6.1	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	AMERICIUM-241		0.008			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	GROSS ALPHA		0.78			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	GROSS BETA		2.4			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	PLUTONIUM-239/240		0.008			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	RADIUM-226	0.25	0.040	BJ	0.060	14.34	4.6	1.39e+0
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	URANIUM-233,-234		1.3			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	URANIUM-235		0.20			14.34	4.6	
881	217	Perimeter	BU00020ER	17-Aug-93	DRADS	URANIUM-238		0.74			14.34	4.6	

(1) - Calculated assuming 560 mg dust per square meter

Table 3.6-3
Smear Sample Results - IHSS 217

				Pre-Rinsate Smear Sample		*Pre-Rinsate Dust Concentration (1)*		*Post-Rinsate Smear Sample*		*Post-Rinsate Dust Concentration (1)*	
Building	*Room*	*IHSS*	*Area*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*	*Alpha (dpm/100 cm^2)*	*Beta (dpm/100 cm^2)*	*Alpha (pCi/g)*	*Beta (pCi/g)*
881	131C	217	1	3	0	2.4e+2	0.0e+0	0	3	0.0e+0	2.4e+2
			2	0	12	0.0e+0	9.7e+2	6	0	4.8e+2	0.0e+0
			3	0	18	0.0e+0	1.4e+3	0	12	0.0e+0	9.7e+2
			4	0	30	0.0e+0	2.4e+3	3	0	2.4e+2	0.0e+0
			5	3	18	2.4e+2	1.4e+3	3	9	2.4e+2	7.2e+2
			6	6	0	4.8e+2	0.0e+0	0	30	0.0e+0	2.4e+3
			7	6	39	4.8e+2	3.1e+3	0	9	0.0e+0	7.2e+2
			8	6	3	4.8e+2	2.4e+2	3	30	2.4e+2	2.4e+3
			9	0	0	0.0e+0	0.0e+0	0	9	0.0e+0	7.2e+2
			10	3	27	2.4e+2	2.2e+3	3	33	2.4e+2	2.7e+3
			11	0	24	0.0e+0	1.9e+3	0	6	0.0e+0	4.8e+2
			12	3	36	2.4e+2	2.9e+3	6	24	4.8e+2	1.9e+3
			13	6	24	4.8e+2	1.9e+3	9	3	7.2e+2	2.4e+2

(1) - Calculated assuming 560 mg dust per square meter

Table 3.6-4
Beta and Gamma Dose-Rate Survey Data - IHSS 217

Building	*Room*	*IHSS*	*Area*	*Gamma Dose-Rate (mrem/hr)*	*Beta Dose-Rate (mrem/hr)*
881	131C	217	1	0	0.4
			2	0	0.4
			3	0	0.4
			4	0	0.4
			5	0	0.4
			6	0	0.4
			7	0	0.4
			8	0	0.4
			9	0.1	0
			10	0.1	0
			11	0.1	0
			12	0	0
			13	0	0

Section 4.0

4.0 SELECTION OF CONSTITUENTS OF CONCERN

This section details the selection process for determining which compounds will be evaluated during the screening and risk assessment process for each IHSS. The Work Plan lists compounds which have been stored, handled, or used at each IHSS. The Work Plan calls for specific analyses to be performed for each IHSS. These include the constituents identified in the Work Plan, as well as other compounds on the EPA TCL and TAL lists, depending on the IHSS. The EPA "Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual - Part A: Baseline Risk Assessment" (RAGS Part A) (EPA, 1989) calls for a screening process to reduce the number of constituents evaluated at a site based on the concentrations and toxicities of constituents detected. Typically, a semi-quantitative selection process is performed prior to evaluating potential risks at a site.

To provide complete coverage of all potential COCs at OU 15, a concentration/toxicity screen will not be used to select the COCs. Rather, all positively identified constituents which are detected at any IHSS will be included in the risk screening and risk assessment processes. Only compounds which are eliminated from the OU 15 database for chemical quality assurance reasons will be excluded from the risk evaluation.

Various fields in the RFEDS database were examined to select records which should be retained for further evaluation in the screening assessment. The selection criteria includes:

- Results qualified with a "U", indicating that the compound was not detected above the instrument detection limit in the sample, were eliminated from further consideration.
- Results for organic chemicals qualified with a "B", indicating that the compound was also detected in a blank sample at a similar concentration, were considered laboratory artifacts and eliminated from further consideration.

- Only results with a QC CODE of "REAL" were included. Other QC CODE values indicate blank samples or other quality assurance samples.
- Only results with a RESULT TYPE of "TRG" were evaluated. Other RESULT TYPE codes indicate non-target parameters such as tentatively identified compounds and unknowns.
- Results reported in units of percent (%) indicate matrix spike compounds added to a sample by the laboratory for quality assurance purposes. These records were not considered further.
- All data manually collected (i.e., smear sample results and dose-rate survey results) were included for further evaluation.

The remaining compounds were included as potential COCs for this screening analysis. It must be noted that at the time of publication, the validation process had not been completed by RFEDS. A fully validated data set will be provided in the Phase I RFI/RI Report. In addition, radionuclide results for two hot water rinsate samples (BU00047ER and BU00050ER) were not available in RFEDS at the time of publication. These data were received in hard copy, however, and were manually added to the data tables presented in Section 3.0.

The fixed alpha- and beta-radiation surveys will not be evaluated further. Due to the high detection limits of the instruments used, and the variability of the results, these data are not of the appropriate quality for the screening analysis. For alpha radiation, only the removable portion of the total radiation is important, since alpha radiation is only a health concern via ingestion or inhalation. External alpha radiation will not generally penetrate even the outer layers of skin. For beta radiation, the removable portion is characterized by the beta smear samples, while the external irradiation component from fixed beta radiation is characterized by the beta dose-rate surveys. The data provided by the removable alpha and beta smear samples, and the beta and gamma dose-rate surveys are of higher quality, and are sufficient to complete the radiological analysis of each IHSS.

Data collected during the field sampling which will be evaluated in the risk screening and assessment include:

- removable radiological contamination (alpha and beta) smear samples;
- removable beryllium contamination smear samples;
- beta- and gamma-radiation dose-rate surveys; and
- hot water rinsate samples analyzed for VOCs, base-neutral aromatic (semi-volatile) compounds, dissolved metals, cyanide and dissolved radionuclides.

Table 4-1 lists the COCs for each IHSS based on the current OU 15 database. This list forms the basis for the derivation of screening levels described in Section 5.0.

Table 4-1
Potential Constituents of Concern

IHSS 178

Semi-volatiles
BENZOIC ACID
BENZYL ALCOHOL
BIS(2-ETHYLHEXYL)PHTHALATE
BUTYL BENZYL PHTHALATE
DI-n-BUTYL PHTHALATE
DI-n-OCTYL PHTHALATE
PHENOL

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
RADIUM-226
URANIUM-233,-234
URANIUM-235
URANIUM-238

Table 4-1
Potential Constituents of Concern

IHSS 179

Semi-volatiles
1,3-ISOBENZOFURANDIONE
2-ETHYL-1-HEXANOL
4,4'-ISOPROPYLIDENEDIPHENOL
BIS(2-ETHYLHEXYL)PHTHALATE
BUTYL BENZYL PHTHALATE
DI-n-OCTYL PHTHALATE
PHENOL

Metals
BERYLLIUM

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
RADIUM-226
URANIUM-233,-234
URANIUM-235
URANIUM-238

Table 4-1
Potential Constituents of Concern

IHSS 180

Semi-volatiles
1,3-ISOBENZOFURANDIONE
4,4'-ISOPROPYLIDENEDIPHENOL
BIS(2-ETHYLHEXYL)PHTHALATE
DI-n-BUTYL PHTHALATE
DI-n-OCTYL PHTHALATE
PHENOL

Metals
BERYLLIUM

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
RADIUM-226
URANIUM-233,-234
URANIUM-235
URANIUM-238

Table 4-1
Potential Constituents of Concern

IHSS 204

Semi-volatiles
2-NITROPHENOL
N-METHYLPYRROLIDONE
BIS(2-ETHYLHEXYL)PHTHALATE
DI-n-OCTYL PHTHALATE
Dodecanoic acid
Hexadecanoic Acid
PHENOL

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
URANIUM-233,-234
URANIUM-235
URANIUM-238

Table 4-1
Potential Constituents of Concern

IHSS 211

Volatiles
TOTAL XYLENES

Semi-volatiles
2-METHYLPHENOL
BENZOIC ACID
BENZYL ALCOHOL
BUTYL BENZYL PHTHALATE
DI-n-BUTYL PHTHALATE
DI-n-OCTYL PHTHALATE
PHENOL

Metals
CADMIUM
CALCIUM
COPPER
IRON
LEAD
POTASSIUM
SILICON
SODIUM
ZINC

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
RADIUM-226
URANIUM-233,-234
URANIUM-235
URANIUM-238

Table 4-1
Potential Constituents of Concern

IHSS 217

Volatiles
4-METHYL-2-PENTANONE
CHLOROFORM
TOTAL XYLENES

Semi-volatiles
BENZYL ALCOHOL
BIS(2-ETHYLHEXYL)PHTHALATE
BUTYL BENZYL PHTHALATE
PHENOL

Metals
BERYLLIUM
CADMIUM
CALCIUM
CHROMIUM
COBALT
COPPER
CYANIDE
IRON
LITHIUM
MAGNESIUM
MANGANESE
MERCURY
NICKEL
POTASSIUM
SILICON
SILVER
SODIUM
ZINC

Radionuclides
AMERICIUM-241
GROSS ALPHA
GROSS BETA
PLUTONIUM-239/240
RADIUM-226
URANIUM-233,-234
URANIUM-235
URANIUM-238

Section 5.0

5.0 DERIVATION OF SCREENING LEVELS

This section presents the derivation of screening levels to be used in performing an initial screening of all data collected at the OU 15 IHSSs. The data which will be evaluated (as described in Section 4.0) include:

- dose-rate data, expressed as millirems of radiation exposure per year;
- concentration data for smear samples, expressed as chemical mass or radiological activity per unit area; and
- concentration data for hot water rinsate samples, expressed as chemical mass or radiological activity per unit volume (these were converted to a unit area basis consistent with the smear sampling data).

The constituents for which screening levels will be developed are presented in Table 4-1, and include all positively identified compounds at OU 15.

The screening levels derived in this section are used as part of the overall screening process described in Section 6.0. The purpose of the screening levels is to identify IHSSs where concentrations of constituents detected may be of sufficient concern (under very conservative, worst-case exposure assumptions) to warrant further evaluation in a formal risk assessment. The derivation of the screening levels is designed to overestimate risks and exposures; therefore the assumptions used to derive the screening levels may not be appropriate in a formal risk assessment.

Based on the types of data collected (radiological and chemical), two types of screening approaches have been derived. The first type is a dose-based screening approach which focuses on an upper-bound acceptable rate at which exposed individuals may be exposed to radiation. The second type of screening is a risk-based approach, focusing on an upper-bound acceptable concentration of a constituent to prevent adverse health effects in the exposed individuals. These two types of screening levels are addressed in Sections 5.1 and 5.2. Dose-rate and radioisotope activity data were evaluated using the first screening approach (dose-based), while the chemical concentration data were evaluated using the second screening approach (risk-based).

5.1 *Dose-Based Screening*

Dose-based screening levels express the maximum rate (e.g., hourly or daily) at which individuals may be exposed to radiation. Dose-rates are typically expressed as millirems per year or rems per year, and indicate the maximum acceptable whole-body dose an individual may receive over the indicated time period. Dose-based screening levels do not relate directly to excess cancer risk, and are commonly used by health-physicists or promulgated as guidance by DOE, the Atomic Energy Commission, and the Nuclear Regulatory Commission (NRC).

The dose-based screening approach was used to evaluate the beta and gamma radiation dose-rate survey results and the radioisotope activity results from the smear and hot water rinsate sampling data. The dose-rate survey data approximate the dose received by an individual resulting from beta and gamma radiation in the area surveyed. As such, they provide an estimate of whole-body radiation resulting from external irradiation of the exposed individual. In addition, activity levels of specific radionuclides from the hot water rinsate samples and from pre- and post-rinsate smear samples were converted to dose-rates assuming intake of contaminated dust via ingestion and inhalation.

Dose conversions were calculated using the Hanford Environmental Dosimetry System (Generation II, or GENII). The GENII computer code was developed through the Hanford Environmental Dosimetry Upgrade Project in November 1988, and is designed to implement the internal dosimetry models recommended by the International Commission on Radiological

Protection. Additional details on the operation of the GENII code can be found in "GENII - The Hanford Environmental Dosimetry Software System, Volumes 1 through 3" (Napier, et. al., 1988).

Exposure levels calculated from field radiation survey data and from smear and hot water rinsate samples will be compared to the Code of Federal Regulations (CFR) and DOE standards outlined in Section 3.0 of the Work Plan. The standards are as follows:

10 CFR 20:	Protection against radiation;
29 CFR 1910.96 (b):	Exposure of individuals to radiation in restricted areas;
29 CFR 1910.96 (c):	Exposure of airborne radioactive materials;
29 CFR 1910.96 (l):	Notification of incidents;
DOE Order 5400.5:	Radiation protection of the public and the environment; and
DOE Order 5480.11:	Radiation protection for occupational workers.

The specific dose-rate standards that are used to establish the screening levels for the OU 15 Stage I and II data are listed below:

Whole body; head and trunk; active blood-forming organs; lens of eyes; or gonads	1-¼ rem per calendar quarter
hands and forearms; feet and ankles	18-¾ rem per calendar quarter
skin of whole body	7-½ rem per calendar quarter

The specific airborne radionuclide concentration standards that are used to establish the screening levels for the OU 15 Stage I and II data are organized according to limits for occupational workers and for individuals less than 18 years of age (minors), and are provided below:

Radionuclide	Occupational	Minor
Am-241 (soluble)	6E-12 μCi/ml	2E-13 μCi/ml
Ra-226 (soluble)	3E-11 μCi/ml	3E-12 μCi/ml
Pu-239 (soluble)	2E-12 μCi/ml	6E-14 μCi/ml
Pu-240 (soluble)	2E-12 μCi/ml	6E-14 μCi/ml
U-233 (soluble)	5E-10 μCi/ml	2E-11 μCi/ml
U-234 (soluble)*	6E-10 μCi/ml	2E-11 μCi/ml
U-235 (soluble)*	5E-10 μCi/ml	2E-11 μCi/ml
U-238 (soluble)*	7E-11 μCi/ml	3E-12 μCi/ml

* For soluble mixtures of U-234, U-235, and U-238 in air, chemical toxicity may be the limiting factor. The references listed above provide details on calculating the concentration values.

The radionuclide results were screened against the screening criteria identified above. These screening criteria include maximum permissible air concentrations of specific radionuclides and maximum dose-rate limits for exposure to all radionuclides. The radiological screening was performed in four steps, as follows:

1. Acceptable air concentrations of radionuclides were converted to acceptable dust concentrations using the following equation, which is presented in "Residual Radioactive Contamination from Decommissioning" (NRC, 1990):

$$C_{dust}\left(\frac{pCi}{g}\right) = \frac{C_{air}\left(\frac{pCi}{m^3}\right)}{DL\left(\frac{g}{m^3}\right)}$$

where DL is the dust loading in air. The dust loading value used was 52.5 μg/m^3 (Hawley, 1985). This value is representative of a typical indoor air dust loading in a residential setting. Kennedy, et. al., (NRC, 1990) use a commercial/industrial indoor air dust loading of 1 μg/m^3; however, the higher value was used to provide a more conservative screening analysis (i.e., lower acceptable dust concentrations). Also to provide a conservative screening approach, the maximum permissible air concentrations for minors were used to screen the radionuclide results. Table 5-1 shows the acceptable air concentrations for radionuclides detected at OU 15, and the corresponding acceptable radionuclide concentrations in dust. These concentrations in dust were used to screen the hot water rinsate radionuclide results shown in Tables 3.1-2, 3.2-2, 3.3-2, 3.5-2, and 3.6-2.

2. The post-rinsate alpha and beta smear sample results presented in Tables 3.1-3, 3.2-3, 3.3-3, 3.5-3 and 3.6-3 were also screened against the concentrations shown in Table 5-1. Since the specific radionuclide inventory making up the total alpha and beta counts is unknown, the conservative assumption was made to screen against the radionuclide with the lowest acceptable concentration in dust. All of the radionuclides detected at OU 15 (americium-241, radium-226, plutonium-239/240, uranium-233/234, uranium-235, and uranium-238) are alpha particle emitters. Therefore, the lowest concentration shown in Table 5-1 (1.14×10^3 mg/kg in dust for plutonium 239/240) was used to screen all alpha smear data. Of the radionuclides detected at OU 15, only uranium-235 is a beta-emitter. Therefore, all beta smear samples were screened against the acceptable dust concentration for uranium-235.

3. The beta and gamma dose-rate survey results presented in Tables 3.1-4, 3.2-4, 3.3-4, 3.5-4 and 3.6-4 were screened against the whole body dose limit of 1-¼ rem per calendar quarter, listed in Section 5.0. This dose limit was converted assuming a standard worker exposure of 500 hours per quarter, resulting in a screening level of 2.5 mrem/hr.

4. In IHSSs where any of the hot water rinsate radionuclide results, the alpha and beta smear sample results, or the beta and gamma dose-rate surveys failed the initial screening, the post-rinsate smear data were used in conjunction with the GENII computer code to determine the pathway-specific and organ-specific doses resulting from the maximum total alpha or beta activity detected anywhere in the IHSS. The approach for application of the GENII code to an indoor dust exposure scenario is fully documented (NRC, 1990). The approach used here used a more conservative dust loading value (Hawley, 1985) than the NRC

approach. In addition, the use of the highest activity detected in the IHSS, instead of an average activity, yielded a conservative estimate of the total dose. Finally, since the radionuclide inventory in the total alpha and beta smear results was unknown, a GENII run was made using the total activity for each of the radionuclides detected at OU 15. The highest predicted dose-rate was then compared to the quarterly dose-rate limit to complete the screening analysis.

The results of the chemical screening and the four-step radiological screening for each IHSS are presented in Section 6.0.

5.2 *Risk-Based Screening Levels*

Risk-based screening levels are derived using risk assessment techniques to determine concentrations of constituents which, under the defined conditions of exposure, would not result in exceeding the specified risk and hazard targets. Substantial guidance has been published by EPA, primarily in the "Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual - Part B: Preliminary Remediation Goals" (RAGS Part B) (EPA, 1991); however, the existing guidance covers only the common environmental media (i.e., soil, ground water, surface water, and air). Exposures to constituents within IHSSs at OU 15 will occur primarily through direct contact with surfaces in the IHSSs and subsequent exposure to contaminated dust and other loose materials. Thus, specific equations were required to describe the degree of exposure expected within the OU 15 buildings and to back-calculate acceptable surface concentrations of COCs.

The derivation of the equations used to calculate risk-based screening levels for COCs was performed in several steps. These following steps are described in Sections 5.2.1 through 5.2.3:

1. Identify potentially exposed populations.
2. Determine potential exposure routes.
3. Derive screening level equations and values.

Calculated risk-based screening levels are presented in Section 5.2.3. It should be noted that the following sections address the derivation of screening levels, and thus contain assumptions which are appropriate only at a screening level. The purpose of deriving screening levels is to develop a very conservative exposure scenario using exposure and intake assumptions which may not be appropriate in a formal risk assessment. During the risk assessment phase of this project (i.e., TM#2), more realistic exposure assumptions will be presented which may deviate significantly from the conservative approach taken here.

5.2.1 Identification of Potentially Exposed Populations

The current and expected future land use of the OU 15 IHSSs is commercial/industrial. The buildings in which the OU 15 IHSSs are located will remain under DOE control for use as a work place until such time as the buildings undergo final decontamination and decommissioning. Therefore, current and future populations using the IHSSs include only workers. Although the type of work performed will vary by IHSS and may change over time, a general worker population scenario assuming unrestricted work access to all areas is deemed appropriate for the screening level derivation. The only deviation from a normal worker population assumption occurs for RCAs, where specific types of activities (e.g., wearing protective clothing) are assumed to be a part of the working environment. Specific assumptions and exposure parameters appropriate for the identified worker populations are discussed in Section 5.2.3.

5.2.2 *Determination of Potential Exposure Routes*

All of the IHSSs evaluated under the OU 15 Phase I RFI/RI are indoor areas consisting of painted and unpainted concrete work areas (rooms) and associated equipment. The environmental media sampled and analyzed for the presence of contaminants are surfaces and the loose material on those surfaces (i.e., dust, chips, and particles). In addition, direct radiation emitted from the surfaces was measured. Therefore, the exposure routes of concern are those associated with contaminated surfaces including equipment, paint, and concrete.

The exposure routes considered in the derivation of screening levels for chemical constituents include:

- incidental ingestion of dust and loose material resulting from various types of contact with the surfaces;
- absorption of chemicals through the skin resulting from adherence of contaminated loose materials to the skin; and
- inhalation of airborne dust derived from the contaminated surfaces.

These three exposure routes were combined to evaluate the total intake for potentially exposed individuals via ingestion, absorption, and inhalation.

5.2.3 *Derivation of Screening Level Equations and Values*

Risk-based screening levels are derived following the EPA guidance provided in RAGS Part B. The chemical intake from ingestion of surface materials for an adult worker population is calculated as follows:

$$I_{ing} = \frac{C_{dust} * CF * IR * EF * ED}{BW * AT}$$

where,

I_{ing} = ingestion intake (mg/kg-day)

C_{dust} = chemical concentration in dust (mg/kg)

CF = conversion factor (10^{-6} kg/mg)

IR = dust ingestion rate (mg/day)

EF = exposure frequency (days/year)

ED = exposure duration (years)

BW = body weight (kg)

AT = averaging time (days)

Similarly, the chemical intake via dermal absorption is calculated as follows:

$$I_{dermal} = \frac{C_{dust} * CF * AF * SA * ABS * EF * ED}{BW * AT}$$

where,

I_{dermal} = dermal intake (mg/kg-day)

AF = adherence factor (mg/cm^2-day)

SA = skin area exposed (cm^2)

ABS = absorption fraction (unitless)

Finally, the intake via inhalation of dust in ambient air is calculated as follows:

$$I_{inh} = \frac{C_{dust} * CF * D_{air} * INH * EF * ED}{BW * AT}$$

where,

I_{inh} = inhalation intake (mg/kg-day)

D_{air} = amount of dust in air (mg/m^3)

INH = amount of air inhaled in the work place (m^3/day)

It should be noted that the inhalation intake is calculated assuming that the concentration of a chemical in the airborne dust is the same as the concentration of that chemical in dust on the surfaces in the room.

For carcinogenic constituents, the risk is calculated as:

$$Risk=(I_{ing}*CSF_o)+(I_{dermal}*CSF_o)+(I_{inh}*CSF_i)$$

where,

CSF_o = oral cancer slope factor (kg-day/mg)

CSF_i = inhalation cancer slope factor (kg-day/mg)

For non-carcinogenic constituents, the hazard quotient is calculated as:

$$HQ=\left(\frac{I_{ing}}{RfD_o}\right)+\left(\frac{I_{dermal}}{RfD_o}\right)+\left(\frac{I_{inh}}{RfD_i}\right)$$

where,

HQ = hazard quotient (unitless)

RfD_o = oral reference dose (mg/kg-day)

RfD_i = inhalation reference dose (mg/kg-day)

By setting the risk (or hazard quotient) equal to a target risk level (or target hazard quotient), and rearranging the above equation, the final equations for surface screening levels for carcinogenic and non-carcinogenic constituents are:

Carcinogens:

$$SL = \frac{TR*BW*AT}{EF*ED*CF*\left[(CSF_o*IR)+(CSF_o*AF*SA*ABS)+(CSF_i*D_{air}*INH)\right]}$$

Non-carcinogens:

$$SL = \frac{THQ*BW*AT}{EF*ED*CF*\left[\left(\frac{1}{RfD_o}*IR\right)+\left(\frac{1}{RfD_o}*AF*SA*ABS\right)+\left(\frac{1}{RfD_i}*D_{air}*INH\right)\right]}$$

where,

SL = screening level for surface dust concentrations (mg/kg)

TR = target risk level

THQ = target hazard quotient

The specific assumptions regarding values for the above listed parameters are given in Table 5-2. Screening levels for chemical constituents are given in Table 5-3. Chemical screening levels were derived in terms of the concentration of potential COCs in dust. The data tables presented in Section 3.0 show hot water rinsate sample chemical results and contain the estimated dust concentration associated with each result. These data are directly comparable with the derived chemical screening levels.

Table 5-2
Exposure Parameter Values

Parameter	Value	Reference
TR	10^{-6}	See Text
THQ	1	See Text
IR	50 mg/day	See Text
D_{air}	0.0525 mg/m^3	Hawley, 1985
EF	250 days/yr	EPA, 1991
ED	25 years	EPA, 1991
BW	70 kg	EPA, 1991
AT (carcinogens)	25550 days	EPA, 1991
AT (non-carcinogens)	9125 days	EPA, 1991
AF	1.45 mg/cm^2-day	EPA, 1989
SA	2000 cm^2	EPA, 1989
ABS	chemical-specific	See Text
INH	6.67 m^3/day	EPA, 1991

The target risk level used (one in one million) is the EPA point of departure for evaluating carcinogenic risk. Although the EPA has determined that risks within a range of 10^{-6} to 10^{-4} are acceptable, the 10^{-6} point of departure provides a conservative starting point for the screening analysis. Similarly, the EPA has determined that a target hazard quotient of 1.0 is appropriate.

There are no data available that directly address the amount of dust ingested in an indoor setting. EPA has recommended the use of 50 mg/day combined soil and dust ingestion for an adult worker population. This value serves as an upper bound for dust ingestion for the indoor worker scenario since the 50 mg/kg includes both dust and soil. In the absence of more site-specific data, the upper bound value of 50 mg/day is appropriate for this screening evaluation.

The amount of dust in air in the OU 15 IHSSs is an important parameter for estimating the chemical (and radiological) intake via the inhalation pathway. Hawley suggests that 52.5 $\mu g/m^3$ (0.0525 mg/m^3) represents an appropriate indoor airborne dust concentration for residential settings (Hawley, 1985). No data could be found pertaining to airborne dust levels in commercial/industrial settings; therefore, the value given by Hawley for residential settings was used in the screening analysis.

The adherence factor (AF) reflects the amount of dust assumed to adhere to the exposed skin surface from which chemicals will desorb through the skin and into the blood stream. The value of 1.45 mg/cm^2 is given for sandy loam soil and is assumed to be representative for the type of loose surface material expected to be derived from exposed surfaces at OU 15. The skin surface area exposure rate (SA) of 2000 cm^2/day represents complete coverage of the head and hands for an average adult male, every day.

The absorption fraction (ABS) reflects the portion of a constituent in contact with the skin that will be absorbed through the skin and into the blood stream. Although data are available for this parameter for some constituents, the use of default values for classes of compounds is appropriate at the screening level. EPA recommends the use of 0.1% for metals, 5% for semi-volatile organic compounds, and 10% for VOCs.

The inhalation rate (INH) reflects the total amount of air inhaled at the work place per day. It is derived from the total daily inhalation rate of 20 m^3/day assuming an eight-hour work shift (i.e., 8/24 * 20 m^3/day = 6.67 m^3/day).

Table 5-1
Radionuclide Screening Levels

Radionuclide	*Air Standard (uCi/ml)*	*Air Standard (pCi/m^3)*	*Dust Equivalent (1) (pCi/g)*
Am-241	2.00e-13	0.2	3.81e+3
Ra-226	3.00e-12	3	5.71e+4
Pu-239	6.00e-14	0.06	1.14e+3
Pu-240	6.00e-14	0.06	1.14e+3
U-233	2.00e-11	20	3.81e+5
U-234	2.00e-11	20	3.81e+5
U-235	2.00e-11	20	3.81e+5
U-238	3.00e-12	3	5.71e+4

(1) - calculated assuming 52.5 ug/m^3 dust in air

NOTICE:

TABLE 5-2, Exposure Parameter Values, can be found on Page 5-14 within Section 5.

Table 5-3
Chemical Screening Level Calculations for Dust

Compound	CAS Number	Absorption Fraction	Reference Dose (Oral) (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)^-1	Reference Dose (Inhalation) (mg/kg-d)	Cancer Slope Factor (Inhalation) (mg/kg-d)^-1	Noncarcinogenic Screening Level (mg/kg)	Carcinogenic Screening Level (mg/kg)
Volatiles								
2-BUTANONE	78-93-3	1.00e-1	6.00e-1		2.86e-1		1.80e+5	
4-METHYL-2-PENTANONE	108-10-1	1.00e-1	5.00e-2				1.50e+4	
CHLOROFORM	67-66-3	1.00e-1	1.00e-2	6.10e-3		8.10e-2	3.01e+3	1.36e+2
ETHYLBENZENE	100-41-4	1.00e-1	1.00e-1		2.86e-1		3.00e+4	
METHYLENE CHLORIDE	75-09-2	1.00e-1	6.00e-2	7.50e-3		1.65e-3	1.80e+4	1.12e+2
TOLUENE	108-88-3	1.00e-1	2.00e-1		1.14e-1		6.00e+4	
TOTAL XYLENES	1330-20-7	1.00e-1	2.00e+0				6.01e+5	
Semi-volatiles (BNAs)								
1,3-ISOBENZOFURANDIONE	85-44-9	5.00e-2	2.00e+0				1.05e+6	
1-Hexanol, 2-ethyl-	104-76-7	5.00e-2						
2-METHYLPHENOL	95-48-7	5.00e-2	5.00e-2				2.62e+4	
2-NITROPHENOL*	88-75-5	5.00e-2	6.20e-2				3.25e+4	
2-Pyrrolidinone, 1-methyl-	872-50-4	5.00e-2						
4,4'-ISOPROPYLIDENEDIPHENOL	80-05-7	5.00e-2	5.00e-2				2.62e+4	
BENZOIC ACID	65-85-0	5.00e-2	4.00e+0				2.10e+6	
BENZYL ALCOHOL	100-51-6	5.00e-2	3.00e-1				1.57e+5	
BIS(2-ETHYLHEXYL)PHTHALATE	117-81-7	5.00e-2	2.00e-2	1.40e-2			1.05e+4	1.05e+2
BUTYL BENZYL PHTHALATE	85-68-7	5.00e-2	2.00e-1				1.05e+5	
DI-n-BUTYL PHTHALATE	84-74-2	5.00e-2	1.00e-1				5.24e+4	
DI-n-OCTYL PHTHALATE	117-84-0	5.00e-2	2.00e-2				1.05e+4	
DIETHYL PHTHALATE	84-66-2	5.00e-2	8.00e-1				4.19e+5	
Dodecanoic acid	143-07-7	5.00e-2						
Hexadecanoic Acid	57-10-3	5.00e-2						
ISOPHORONE	78-59-1	5.00e-2	2.00e-1	4.10e-3			1.05e+5	3.58e+2
PHENOL	108-95-2	5.00e-2	6.00e-1				3.14e+5	
Metals (DMETADD)								
LITHIUM	7439-93-2	1.00e-3	2.00e-2				3.86e+4	
MOLYBDENUM	7439-98-7	1.00e-3	5.00e-3				9.66e+3	
SILICON	7440-21-3	1.00e-3						
STRONTIUM	7440-24-6	1.00e-3	6.00e-1				1.16e+6	

Table 5-3
Chemical Screening Level Calculations for Dust

Compound	CAS Number	Absorption Fraction	Reference Dose (Oral) (mg/kg-d)	Cancer Slope Factor (Oral) (mg/kg-d)^-1	Reference Dose (Inhalation) (mg/kg-d)	Cancer Slope Factor (Inhalation) (mg/kg-d)^-1	Noncarcinogenic Screening Level (mg/kg)	Carcinogenic Screening Level (mg/kg)
Metals (DSMETCLP)								
ANTIMONY	7440-36-0	1.00e-3	4.00e-4				7.73e+2	
ARSENIC	7440-38-2	1.00e-3	3.00e-4	1.75e+0		1.51e+1	5.80e+2	2.92e+0
BARIUM	7440-39-3	1.00e-3	7.00e-2		1.43e-4		3.19e+4	
BERYLLIUM	7440-41-7	1.00e-3	5.00e-3	4.30e+0		8.40e+0	9.66e+3	1.24e+0
CADMIUM	7440-43-9	1.00e-3	1.00e-3			6.10e+0	1.93e+3	1.34e+2
CALCIUM	7440-70-2	1.00e-3						
CHROMIUM	7440-47-3	1.00e-3	5.00e-3			4.20e+1	9.66e+3	1.95e+1
COBALT	7440-48-4	1.00e-3						
COPPER	7440-50-8	1.00e-3	3.71e-2				7.17e+4	
IRON	7439-89-6	1.00e-3						
LEAD	7439-92-1	1.00e-3						
MAGNESIUM	7439-95-4	1.00e-3						
MANGANESE	7439-96-5	1.00e-3	1.40e-1		1.43e-5		4.11e+3	
MERCURY	7439-97-6	1.00e-3	3.00e-4		8.57e-5		5.66e+2	
NICKEL	7440-02-0	1.00e-3	2.00e-2				3.86e+4	
POTASSIUM	7440-09-7	1.00e-3						
SILVER	7440-22-4	1.00e-3	5.00e-3				9.66e+3	
SODIUM	7440-23-5	1.00e-3						
VANADIUM	7440-62-2	1.00e-3	7.00e-3				1.35e+4	
ZINC	7440-66-6	1.00e-3	3.00e-1				5.80e+5	
Miscellaneous								
CYANIDE	57-12-5	1.00e-3	2.00e-2				3.86e+4	

* - Value for 4-Nitrophenol used

Section 6.0

6.0 EVALUATION OF STAGE I AND II DATA

This section presents the decision process used for each IHSS to determine the need for further action indoors (i.e., risk assessment) and outdoors (i.e., Stage III work). The decision logic is presented in Section 6.1. A discussion of the hot water rinsate chemical results for one specific compound, bis(2-ethylhexyl)phthalate (DEHP), is included in Section 6.2. Sections 6.3 through 6.8 present the decision process applied to each IHSS. Section 6.9 provides a summary of the decision process for all IHSSs.

6.1 Decision Logic

Figure 6-1 is a flow chart that shows the decision logic for evaluating the need for further action indoors and outdoors. This section provides more detailed descriptions of the steps required for the specific decision items included in Figure 6-1.

Following the completion of the Stage I and II field investigations, the process for determining the need for additional outdoor work (Stage III) and additional indoor assessment prior to clean closure began. These two assessment processes are represented, respectively, by the left-hand and right-hand pathways leading from the Stage I and II Characterization box in Figure 6-1.

Evaluation of the Need for Stage III Work

A qualitative evaluation of the release potential was made for each IHSS, and included the materials stored or handled in the IHSS, whether cracks or other release mechanisms exist, and whether secondary containment was present. If it was determined that no potential for a release exists either currently or historically at the IHSS, then no Stage III investigation was recommended. If the potential for a release exists, then additional evaluation was conducted.

If the potential for a release exists, and the release mechanism is directly to the outdoors (e.g., floor crack above soil), then the IHSS was specified for Stage III investigation. If the release pathway involved travel through the building, then the data was evaluated to determine if evidence of migration exists.

If a release mechanism to the outdoors involved travel through a building, then the data was evaluated to determine if a gradient exists from the IHSS (indicating that the IHSS may be the source of the contamination), and whether the concentrations detected were high enough to pose a potential threat. The second determination was performed using the screening criteria presented in Section 5.0. If the concentration data showed a gradient away from the IHSS at levels of potential concern, then Stage III investigation was recommended.

Depending on the magnitude of the proposed Stage III effort, the performance of Stage III activities may be deferred to a second phase of investigation at OU 15. This will allow compliance with the IAG milestones for the indoor IHSSs at OU 15 while allowing a thorough investigation of any potential outdoor impacts.

<u>Evaluation of the Need for Additional Indoor Evaluation</u>

To determine whether any of the IHSSs require additional evaluation prior to clean closure, the data collected during the Stage I and II field investigations were compared to screening criteria. If the concentrations of chemicals and radionuclides present within an IHSS fell below the appropriate screening levels, then no further action was recommended, and the IHSS was considered suitable for clean closure. If, however, concentrations were found in excess of the screening criteria, then the IHSS was recommended for a formal risk assessment to be presented in TM#2.

The decision logic shown in Figure 6-1 was applied to the six OU 15 IHSSs. The results of the analyses are presented for each IHSS in Sections 6.3 through 6.8.

6.2 Occurrence of DEHP

One chemical constituent, DEHP, was detected above the screening level in almost every hot water rinsate sample. DEHP and other phthalate compounds have been identified in paints and plastics, and are common cross-contaminants in environmental samples collected using plastic sampling equipment. Given the use of plastic components in the hot water rinsate sample collection system (e.g., hoses and fittings), and the temperature of the rinsate water, it is likely that DEHP leached out of the sampling equipment. In addition, the use of a hot water rinsate may have caused DEHP to leach from painted surfaces during the sampling operations. Since DEHP was detected at fairly consistent concentrations in all samples, regardless of the type of surface sampled (i.e., painted versus bare concrete), it is more likely that the origin of the DEHP is the plastic equipment used in the collection of hot water rinsate samples. Therefore, DEHP is not considered further in the screening analysis. It is assumed to be an artifact of the sampling apparatus, and is not believed to pose a realistic threat to human health or the environment at OU 15.

6.3 Decision Process for IHSS 178

The decision process for IHSS 178 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.3.1, and the evaluation of the need for Stage III field work is provided in Section 6.3.2.

6.3.1 Indoor Contamination

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 178 are presented below in Sections 6.3.1.1 and 6.3.1.2, respectively.

6.3.1.1 Chemical Screening

With the exception of DEHP, which is discussed in Section 6.2, no chemical constituents were detected at concentrations exceeding their respective screening levels in the hot water rinsate samples collected at IHSS 178.

6.3.1.2 Radiological Screening

Step 1
No radionuclides detected in the hot water rinsate samples from IHSS 178 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1.

Step 2
None of the post-rinsate smear samples from IHSS 178 exhibited total alpha activity which would result in dust concentrations in excess of the most stringent screening level established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1. In addition, none of the post-rinsate smear samples exhibited total beta activity which

would result in dust concentrations in excess of the screening level established to comply with the maximum permissible uranium-235 concentration in air presented in Table 5-1.

Step 3

None of the areas surveyed for beta and gamma dose-rate in IHSS 178 exceeded the established screening limit of 2.5 mrem/hr.

Step 4

Since none of the data collected at IHSS 178 exceeded the screening criteria established described in Steps 1 through 3, no GENII analysis was performed for this IHSS.

6.3.1.3 *Recommendations for IHSS 178 (Indoors)*

Based on the results of the chemical and radiological screening analyses presented above, no further action is recommended with regard to indoor contamination at IHSS 178.

6.3.2 *Stage III Field Work*

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 178 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.3.2.1 and 6.3.2.2, respectively.

6.3.2.1 *Evaluation of Release Potential and Direct Release Mechanisms*

The review conducted during the preparation of the Work Plan revealed no documented releases or spills for IHSS 178. As described in Section 3.1.2, at the time of the Stage I and II field investigations the floor in Building 881, Room 165 was in good condition, with no apparent cracks or gaps. There are no doors or other openings leading directly to the outdoors in the immediate vicinity of the IHSS.

6.3.2.2 *Data Screening and Gradient Analysis*

No chemical constituents (with the exception of DEHP) or radionuclides were detected at IHSS 178 in excess of the established screening criteria. Therefore, a concentration gradient above screening levels does not exist for any chemical constituent or radionuclide at IHSS 178.

6.3.2.3 *Recommendations for IHSS 178 (Stage III Field Work)*

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 178.

6.4 ***Decision Process for IHSS 179***

The decision process for IHSS 179 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.4.1, and the evaluation of the need for Stage III field work is provided in Section 6.4.2.

6.4.1 *Indoor Contamination*

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 179 are presented below in Sections 6.4.1.1 and 6.4.1.2, respectively.

6.4.1.1 *Chemical Screening*

With the exception of DEHP, which is discussed in Section 6.2, no chemical constituents were detected at concentrations exceeding their respective screening levels in hot water rinsate samples collected at IHSS 179.

Beryllium concentrations from smear samples taken in and around the IHSS exceeded the screening level at many of the sample locations. It should be noted that the method detection limit was substantially above the screening level. The pattern of detections and relative magnitude of concentrations within and around IHSS 179 indicate that the beryllium may be associated with other operations within Building 865, and not attributable to IHSS 179. Further action on beryllium contamination should not be required to clean close IHSS 179. Instead, the beryllium contamination should be addressed as a general building concern.

6.4.1.2 *Radiological Screening*

Step 1

No radionuclides detected in the hot water rinsate samples from IHSS 179 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air as presented in Table 5-1.

Step 2

None of the post-rinsate smear samples from IHSS 179 exhibited total beta activity which would result in dust concentrations in excess of the screening level established to comply with the maximum permissible uranium-235 concentration in air as presented Table 5-1. However, almost all of the post-rinsate smear samples exhibited total alpha activity which would result in dust concentrations in excess of the most stringent screening level established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1. Therefore, additional evaluation of the post-rinsate smear total alpha results were conducted in Step 4.

Step 3

None of the areas surveyed for beta and gamma dose-rate in IHSS 179 exceeded the established screening limit of 2.5 mrem/hr.

Step 4

The post-rinsate smear data for total alpha radiation at IHSS 179 failed the conservative screening criteria established under Step 2. Therefore, the GENII model was used to estimate the whole-body dose expected as a result of occupational exposures in IHSS 179. To provide a conservative analysis, the highest total alpha reading from the post-rinsate smear sampling data (69 dpm/100 cm^2 at sampling area 13 [See Figure 2-4]) was used to generate the dust and airborne concentrations for input into the GENII model. The GENII model assumes that the exposed individual receives a radiological dose via incidental ingestion of dust and inhalation of airborne dust, and via direct external irradiation. The dust concentration used for the ingestion and irradiation pathways was converted from the smear sample concentration using an assumed dust loading on surfaces of 560 mg/m^2. This resulted in a radionuclide concentration in dust of 5.6×10^6 pCi/kg. The air concentration was estimated at 0.294 pCi/m^3, as described in Section 5.2.

Since the specific radionuclide inventory comprising the total alpha radiation reading was unknown, the GENII model was run once for each of the six radionuclides detected at OU 15. In each GENII run, the total activity was input assuming that it was all attributable to one of the six radionuclides under evaluation. The maximum predicted dose from any of the six runs was then used as a basis for evaluating the screening results. The results for IHSS 179 were:

Radionuclide	Annual Effective Dose Equivalent
Americium-241	3.4 rem/yr
Plutonium-239/240	0.21 rem/yr
Radium-226	0.85 rem/yr
Uranium-233/234	0.097 rem/yr
Uranium-235	0.51 rem/yr
Uranium-238	0.087 rem/yr

The GENII results for an occupational exposure show annual effective dose equivalents below the limit value of 5 rem/yr (1¼ rem/quarter). The GENII assessment was conservative, since the maximum total alpha radiation reading was used, and the worst-case was selected in terms of the radionuclide inventory comprising the total alpha count.

6.4.1.3 *Recommendations for IHSS 179 (Indoors)*

Based on the results of the chemical and radiological screening analyses presented above, no further action is recommended with regard to indoor contamination at IHSS 179.

6.4.2 *Stage III Field Work*

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 179 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.4.2.1 and 6.4.2.2, respectively.

6.4.2.1 *Evaluation of Release Potential and Direct Release Mechanisms*

The review conducted during the preparation of the Work Plan revealed no documented releases or spills for IHSS 179. As described in Section 3.2.2, at the time of the Stage I and II field investigations the floor in the IHSS 179 area of Building 865, Room 145 was in good condition, with no apparent cracks or gaps. There are no doors or other openings leading directly to the outdoors in the immediate vicinity of the IHSS.

6.4.2.2 *Data Screening and Gradient Analysis*

No chemical constituents (with the exception of DEHP) or radionuclides were detected at IHSS 179 in excess of the established screening criteria. Beryllium was considered a general building concern and not indicative of IHSS contamination. Therefore, a concentration gradient above screening levels does not exist for any chemical constituent or radionuclide at IHSS 179.

6.4.2.3 *Recommendations for IHSS 179 (Stage III Field Work)*

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 179.

6.5 Decision Process for IHSS 180

The decision process for IHSS 180 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.5.1, and the evaluation of the need for Stage III field work is provided in Section 6.5.2.

6.5.1 Indoor Contamination

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 180 are presented below in Sections 6.5.1.1 and 6.5.1.2, respectively.

6.5.1.1 Chemical Screening

With the exception of DEHP, which is discussed in Section 6.2, no chemical constituents were detected at concentrations exceeding their respective screening levels in the hot water rinsate samples collected at IHSS 180.

Beryllium concentrations from smear samples taken in and around the IHSS exceeded the screening level at many of the sample locations. Based on the reported detection limit of the analyses (1 μg/100 cm^2), the equivalent dust concentration at the detection limit (714 mg/kg) is substantially above the screening level. The pattern of detections and relative magnitude of concentrations within and around IHSS 180 indicate that the beryllium may be associated with other operations within Building 883, and not attributable to IHSS 180. Further action on beryllium contamination should not be required to clean close IHSS 180. Instead, the beryllium contamination should be addressed as a general building concern.

6.5.1.2 *Radiological Screening*

Step 1

No radionuclides detected in the hot water rinsate samples from IHSS 180 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air as presented in Table 5-1.

Step 2

None of the post-rinsate smear samples from IHSS 180 exhibited total beta activity which would result in dust concentrations in excess of the screening level established to comply with the maximum permissible uranium-235 concentration in air as presented Table 5-1. However, several of the post-rinsate smear samples exhibited total alpha activity which would result in dust concentrations in excess of the most stringent screening level established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1. Therefore, additional evaluation of the post-rinsate smear total alpha results were conducted in Step 4.

Step 3

Seven of the sampling areas surveyed for beta dose-rate exceeded the established screening limit of 2.5 mrem/hr. None of the areas exceeded the screening limit for gamma dose-rate. Therefore, additional evaluation of radiological exposure was conducted in Step 4.

Step 4

Some of the post-rinsate smear data for total alpha radiation and the beta dose-rate surveys at IHSS 180 failed the conservative screening criteria established under Steps 2 and 3. Therefore, the GENII model was used to estimate the whole-body dose expected as a result of occupational exposures in IHSS 180. To provide a conservative analysis, the highest total alpha or beta reading from the post-rinsate smear sampling data (69 dpm/100 cm^2, total beta at sampling area 10 [See Figure 2-6]) was used to generate the dust and airborne concentrations for input to the GENII model. The GENII model assumes that the exposed individual receives a radiological dose via incidental ingestion of dust and inhalation of airborne dust, and via direct external irradiation. The dust concentration used for the ingestion and irradiation pathways was converted from the smear sample concentration using an assumed dust loading on surfaces of 560 mg/m^2. This resulted in a radionuclide concentration in dust of 5.6×10^6 pCi/kg. The air concentration was estimated at 0.294 pCi/m^3, as described in Section 5.2. By coincidence, these values are the same as those reported for alpha radiation at IHSS 179 in Section 6.4.1.2.

Since the specific radionuclide inventory comprising the total alpha and beta radiation reading was unknown, the GENII model was run once for each of the six radionuclides detected at OU 15. In each GENII run, the total activity was input assuming that it was all attributable to one of the six radionuclides under evaluation. The maximum predicted dose from any of the six runs was then used as a basis for evaluating the screening results. The results for IHSS 180 were:

Radionuclide	Annual Effective Dose Equivalent
Americium-241	3.4 rem/yr
Plutonium-239/240	0.21 rem/yr
Radium-226	0.85 rem/yr
Uranium-233/234	0.097 rem/yr
Uranium-235	0.51 rem/yr
Uranium-238	0.087 rem/yr

The GENII results for an occupational exposure show annual effective dose equivalents below the limit value of 5 rem/yr (1¼ rem/quarter). The GENII assessment was conservative in that the maximum total alpha or beta radiation reading was used, and the worst-case was selected in terms of the radionuclide inventory comprising the total alpha or beta count.

6.5.1.3 Recommendations for IHSS 180 (Indoors)

Based on the results of the chemical and radiological screening analyses presented above, no further action is recommended with regard to indoor contamination at IHSS 180.

6.5.2 Stage III Field Work

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 180 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.5.2.1 and 6.5.2.2, respectively.

6.5.2.1 Evaluation of Release Potential and Direct Release Mechanisms

The review conducted during the preparation of the Work Plan revealed no documented releases or spills for IHSS 180. As described in Section 3.3.2, at the time of the Stage I and II field investigations the floor in the IHSS 180 area of Building 883, Room 104 was scuffed and in poor condition. The damage to the floor in the IHSS and surrounding area was, however, limited to surface scrapes and gouges. Several floor joints were present in the area, but were typically less than one inch in depth. There were no significant cracks or gaps. One overhead dock door was located immediately east of the IHSS area. The floor, however, appeared to slope away from the door, back towards the room.

6.5.2.2 Data Screening and Gradient Analysis

No chemical constituents (with the exception of DEHP) or radionuclides were detected at IHSS 180 in excess of the established screening criteria. Beryllium was considered a general building concern and not indicative of IHSS contamination. Therefore, a concentration gradient above screening levels does not exist for any chemical constituent or radionuclide at IHSS 180.

6.5.2.3 Recommendations for IHSS 180 (Stage III Field Work)

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 180.

6.6 Decision Process for IHSS 204

The decision process for IHSS 204 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.6.1, and the evaluation of the need for Stage III field work is provided in Section 6.6.2.

6.6.1 Indoor Contamination

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 204 are presented below in Sections 6.6.1.1 and 6.6.1.2, respectively.

6.6.1.1 *Chemical Screening*

With the exception of DEHP, which is discussed in Section 6.2, no chemical constituents were detected at concentrations exceeding their respective screening levels at IHSS 204.

6.6.1.2 *Radiological Screening*

IHSS 204 will remain an operational unit within the Building 447 RCA and will continue to be used for handling radioactive material. As a result, the Work Plan did not include post-rinsate smear sampling or beta and gamma dose-rate surveys for IHSS 204. No radionuclides detected in the hot water rinsate samples from IHSS 204 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1. Since final closure with respect to radiological contamination cannot be addressed at this time because of the continued operation of the unit, the radiological screening was not carried any further in this assessment.

6.6.1.3 *Recommendations for IHSS 204 (Indoors)*

Based on the results of the chemical screening analyses presented above, no further action is recommended at this time with regard to indoor chemical contamination at IHSS 204. Recently, as part of a separate project, drums containing uranium oxide processed in the Original Uranium Chip Roaster were sampled. Several of the drums sampled contain uranium oxide that was roasted during the period when the uranium chips were still coated with small amounts of oils and coolants. At the time of publication, the analytical results were not yet available for these samples. If review of the analytical data once they are received indicates the presence of RCRA-regulated organic compounds, the no further action recommendation for IHSS 204 will be reevaluated with respect to contamination inside the Original Uranium Chip Roaster.

6.6.2 *Stage III Field Work*

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 204 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.6.2.1 and 6.6.2.2, respectively.

6.6.2.1 *Evaluation of Release Potential and Direct Release Mechanisms*

The review conducted during the preparation of the Work Plan revealed that two flood events did occur in the basement of Building 447. In both instances, the flood waters were pumped or vacuumed out of the area and processed on site. As described in Section 3.4.2, at the time of the Stage I and II field investigations the floors in Rooms 31, 32, 501 and 502 of Building 447, were in good condition, with no apparent cracks or gaps. The concrete pad and berm of the Wash Rack/Drum Washing Basin were in good condition, with no apparent cracks or gaps. The process drain in the center of the pad is part of the RFP process waste line system. There are no doors or other openings leading directly to the outdoors in the immediate vicinity of Rooms 32 and 502.

6.6.2.2 *Data Screening and Gradient Analysis*

No chemical constituents (with the exception of DEHP) were detected at IHSS 204 in excess of the established screening criteria. Therefore, a concentration gradient above screening levels does not exist for any chemical constituents at IHSS 204.

6.6.2.3 Recommendations for IHSS 204 (Stage III Field Work)

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 204.

6.7 Decision Process for IHSS 211

The decision process for IHSS 211 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.7.1, and the evaluation of the need for Stage III field work is provided in Section 6.7.2.

6.7.1 Indoor Contamination

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 211 are presented below in Sections 6.7.1.1 and 6.7.1.2, respectively.

6.7.1.1 Chemical Screening

No chemical constituents were detected at concentrations exceeding their respective screening levels at IHSS 211.

6.7.1.2 *Radiological Screening*

Step 1

No radionuclides detected in the hot water rinsate samples from IHSS 211 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air as presented in Table 5-1.

Step 2

None of the post-rinsate smear samples from IHSS 211 exhibited total alpha activity which would result in dust concentrations in excess of the most stringent screening level established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1. In addition, none of the post-rinsate smear samples exhibited total beta activity which would result in dust concentrations in excess of the screening level established to comply with the maximum permissible uranium-235 concentration in air presented in Table 5-1.

Step 3

None of the areas surveyed for beta and gamma dose-rate in IHSS 211 exceeded the established screening limit of 2.5 mrem/hr.

Step 4

Since none of the data collected at IHSS 211 exceeded the screening criteria described in Steps 1 through 3, no GENII analysis was performed for this IHSS.

6.7.1.3 *Recommendations for IHSS 211 (Indoors)*

Based on the results of the chemical and radiological screening analyses presented above, no further action is recommended with regard to indoor contamination at IHSS 211.

6.7.2 *Stage III Field Work*

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 211 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.7.2.1 and 6.7.2.2, respectively.

6.7.2.1 *Evaluation of Release Potential and Direct Release Mechanisms*

The review conducted during the preparation of the Work Plan revealed no documented releases or spills for IHSS 211. As described in Section 3.5.2, at the time of the Stage I and II field investigations the floor in Building 881, Room 266B was in good condition. A sealed crack, which was approximately one to two inches wide and ran the length of the room, was present. RFP personnel were unfamiliar with when the crack had first appeared and how often it had been repaired, but did indicate that the crack had most recently been repaired approximately one month prior to the OU 15 Stage I and II site visit. RFP personnel stated that the crack may have originally been narrower, and may have been ground out at the surface to facilitate its repair. RFP personnel added that a standing work order is in effect in the building to repair any damage to secondary containment for RCRA areas, and typically enables needed repairs to be made within 30 days of discovery.

A preliminary review of recent analytical data from the Building 881 footing drain system did not indicate the presence of elevated levels of the IHSS 211 contaminants of concern listed in the Work Plan. It should be noted that the footing drain system is located around the entire perimeter of the original Building 881 foundation, almost directly underneath the annex where Room 266B is located. A soil sample was collected from an unrelated excavation in an adjoining room, approximately 16 feet to the south of the crack in Room 266B. At the time of publication, analytical results were not yet available for this sample. There are no doors or other openings leading directly to the outdoors in the immediate vicinity of the IHSS.

6.7.2.2 Data Screening and Gradient Analysis

No chemical constituents or radionuclides were detected at IHSS 211 in excess of the established screening criteria. Therefore, a concentration gradient above screening levels does not exist for any chemical constituent or radionuclide at IHSS 211.

6.7.2.3 Recommendations for IHSS 211 (Stage III Field Work)

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 211 at this time. If further evaluation of the Building 881 footing drain data and adjoining room soil sample results suggest the presence of contamination attributable to IHSS 211, the recommendation for no Stage III field work for this IHSS will be reevaluated.

6.8 Decision Process for IHSS 217

The decision process for IHSS 217 follows the logic diagram provided in Figure 6-1. The evaluation of indoor contamination is provided in Section 6.8.1, and the evaluation of the need for Stage III field work is provided in Section 6.8.2.

6.8.1 Indoor Contamination

The evaluation of indoor contamination consists of comparing the sampling results presented in Section 3.0 to the screening criteria established in Section 5.0. The process for performing this comparison was presented in Sections 5.1 and 5.2. The results of the screening comparisons for chemical constituents and radionuclides for IHSS 217 are presented below in Sections 6.8.1.1 and 6.8.1.2, respectively.

6.8.1.1 *Chemical Screening*

With the exception of DEHP, which is discussed in Section 6.2, no chemical constituents were detected at concentrations exceeding their respective screening levels in the perimeter (the floor immediately adjacent to the laboratory table and fume hood) sample at IHSS 217. However, several metals, in addition to DEHP, were detected at concentrations exceeding their respective screening levels in the IHSS (on the top surface of the laboratory table and inside the fume hood) sample at IHSS 217. These include beryllium, cadmium, chromium, and manganese.

6.8.1.2 *Radiological Screening*

Step 1
No radionuclides detected in the hot water rinsate samples from IHSS 217 indicated potential dust concentrations in excess of the screening levels established to comply with the maximum permissible radionuclide concentrations in air presented in Table 5-1.

Step 2
None of the post-rinsate smear samples from IHSS 217 exhibited total alpha activity which would result in dust concentrations in excess of the most stringent screening level established to comply with the maximum permissible radionuclide concentrations in air as presented in Table 5-1. In addition, none of the post-rinsate smear samples exhibited total beta activity which would result in dust concentrations in excess of the screening level established to comply with the maximum permissible uranium-235 concentration in air presented in Table 5-1.

Step 3

None of the areas surveyed for beta and gamma dose-rate in IHSS 217 exceeded the established screening limit of 2.5 mrem/hr.

Step 4

Since none of the data collected at IHSS 217 exceeded the screening criteria described in Steps 1 through 3, no GENII analysis was performed for this IHSS.

6.8.1.3 *Recommendations for IHSS 217 (Indoors)*

Based on the results of the chemical and radiological screening analyses presented above, no further action is recommended with regard to indoor contamination at IHSS 217. The Building 881 General Laboratories intend to reuse the laboratory table and fume hood. A standard equipment decontamination will be performed prior to the time the equipment is placed back in service.

6.8.2 *Stage III Field Work*

As presented in Figure 6-1, the determination of the need for Stage III field work for IHSS 217 involves the evaluation of release potential and direct release mechanisms, and the comparison of the concentration gradients leading away from the IHSS to the screening levels. These evaluations are presented in Sections 6.8.2.1 and 6.8.2.2, respectively.

6.8.2.1 *Evaluation of Release Potential and Direct Release Mechanisms*

The review conducted during the preparation of the Work Plan revealed no documented releases from the polyethylene bottles or spills during transfer or neutralization for IHSS 217. As described in Section 3.6.2, at the time of the Stage I and II field investigations the secondary containment for the fume hood and laboratory table, which is provided by the hood itself and an integral lip on the front of table, appeared intact. The floor in Building 881, Room 131C was in good condition, with no apparent cracks or gaps. There are no doors or other openings leading directly to the outdoors in the immediate vicinity of the IHSS.

6.8.2.2 Data Screening and Gradient Analysis

Several metals were detected in excess of their established screening levels on the surfaces of the laboratory table and fume hood. However, no chemical constituents (with the exception of DEHP) or radionuclides were detected in the perimeter (floor) sample in excess of the established screening criteria. Therefore, a concentration gradient above screening levels does not exist for any chemical constituent or radionuclide at IHSS 217.

6.8.2.3 Recommendations for IHSS 217 (Stage III Field Work)

Based on the evaluation of release potential and direct release mechanisms, and the screening of chemical and radiological data for the IHSS, no Stage III field work is recommended for IHSS 217.

6.9 Summary and Conclusions

Section 6.3 presented a decision analysis for each IHSS using the decision process outlined in Figure 6-1. The analysis included an evaluation of:

- whether indoor chemical contamination within each IHSS is at levels low enough to allow for Clean Closure of the unit under RCRA;

- whether the levels of radiological contamination within each IHSS require additional consideration; and

- whether additional Stage III field work is required to delineate any potential outdoor releases from any of the IHSSs.

A summary of the recommendations for each IHSS is provided in Table 6-1.

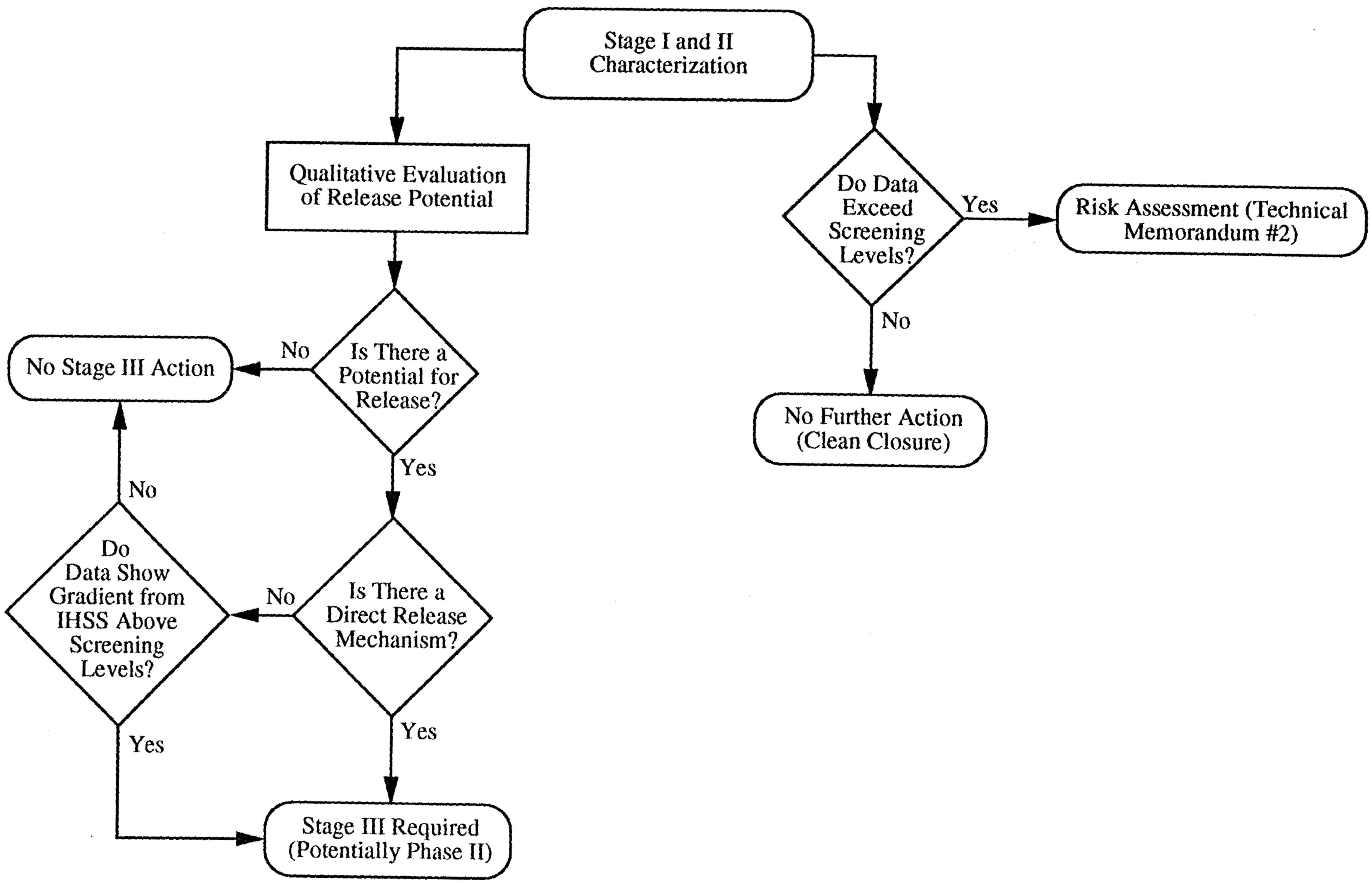
Table 6-1
Decision Summary Matrix

IHSS	Indoor Evaluation		Stage III Field Work
	Chemical	Radiological	
178	NFA (Clean Closure)	NFA	NFA
179	NFA (Clean Closure)	NFA	NFA
180	NFA (Clean Closure)	NFA	NFA
204	NFA[1] (Clean Closure)	NFA[2]	NFA
211	NFA (Clean Closure)	NFA	NFA[3]
217	NFA[4] (Clean Closure)	NFA	NFA

NFA = No Further Action

1 Analytical data from uranium oxide drums will be reviewed.
2 Unit will remain operational and continue to process radioactive material.
3 Building 881 footing drain data and adjacent soil sample results will be reviewed.
4 Laboratory table and fume hood will undergo standard equipment decontamination prior to reuse.

Figure 6-1
Decision Framework for Stage III Investigation (Outdoors) and Clean Closure (Indoors)



Section 7.0

7.0 SCHEDULE

This section presents the proposed schedule for the receipt of comments and submittal of the next version of this report. At this time, no Stage III field work has been proposed. In addition, no further action has been proposed with regard to clean closure of the indoor units with the exception of equipment decontamination at IHSS 217. Therefore, it is proposed that, upon resolution and incorporation of all comments on Technical Memorandum Number 1, the revised document be submitted as the Draft Phase I RFI/RI Report for OU 15. The proposed schedule for comment resolution and submittal of the Draft Phase I RFI/RI Report is as follows:

Submittal of Draft Technical Memorandum Number 1	22 February 1994
Review Period	23 February 1994 - 18 March 1994
Receipt of all Comments	18 March 1994
Comment Resolution	21 March 1994 - 25 March 1994
Submittal of Draft Phase I RFI/RI	8 April 1994

Substantive additions to or modifications of Draft Technical Memorandum Number 1 may result in a revision to the proposed submittal date for the Draft Phase I RFI/RI Report.